TECHNOLOGY DEPT.

Gas Journal

VOL. 288. 108th YEAR. LONDON, OCTOBER 10, 1956. No. 4865. PRICE 1/6

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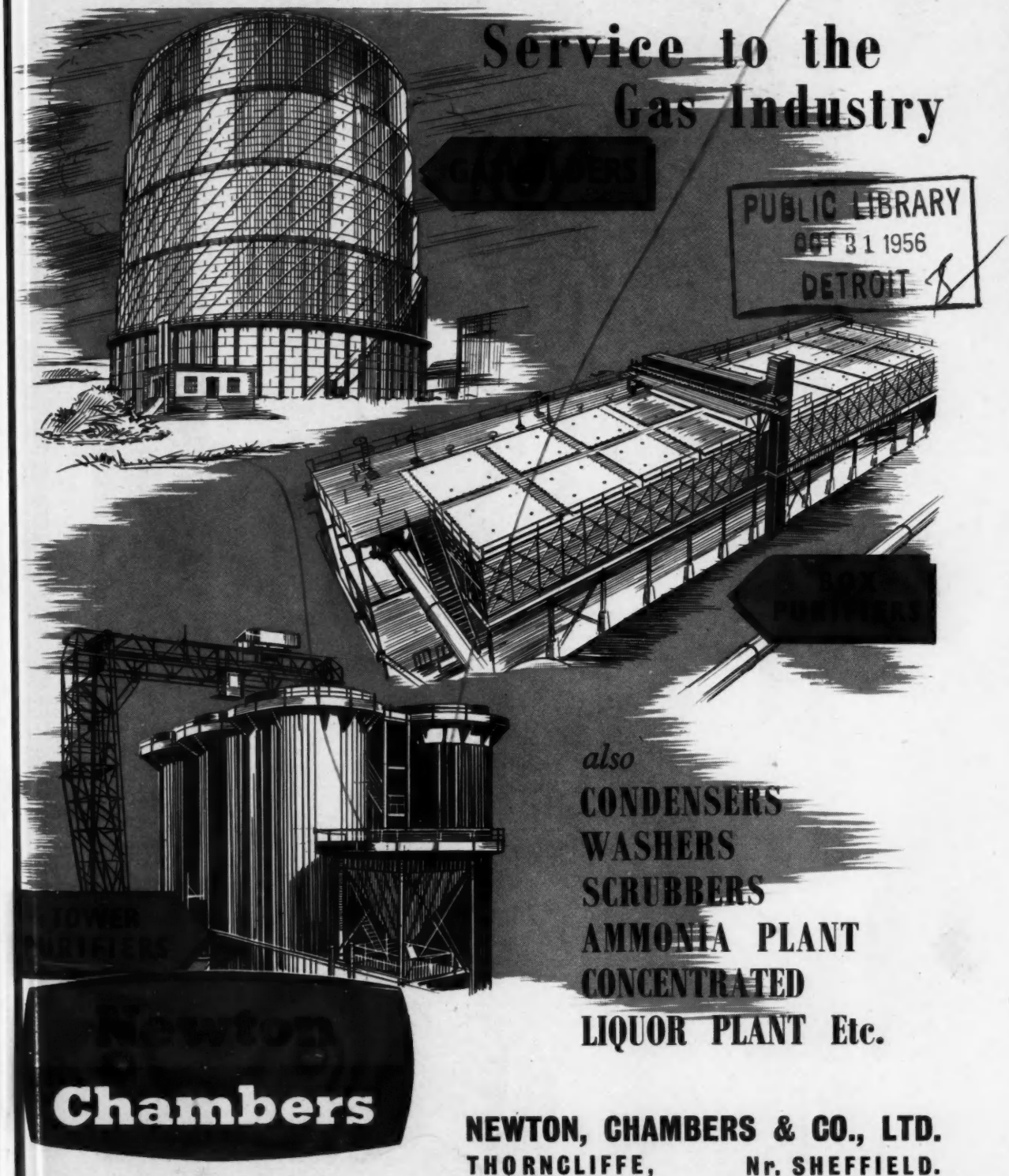

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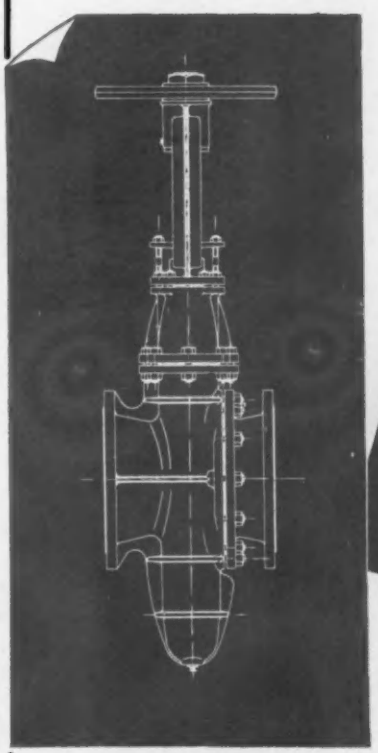
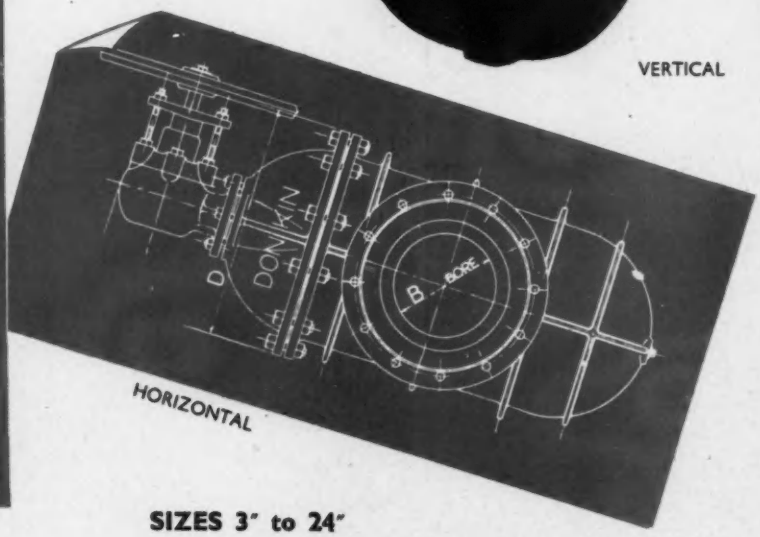


OUTSIDE SCREW



HORIZONTAL

SIZES 3" to 24"

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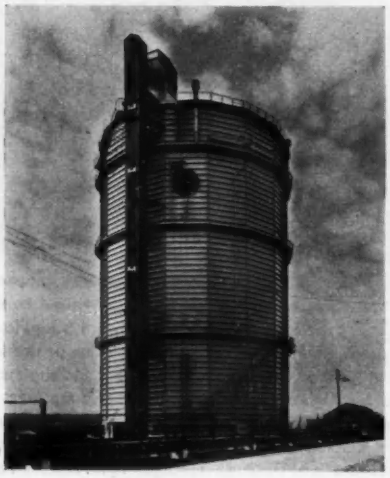

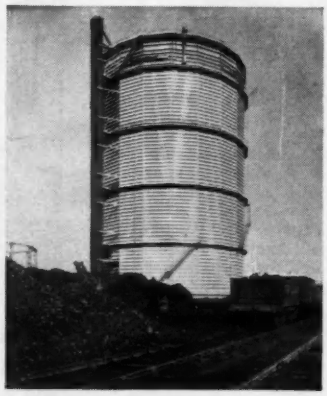

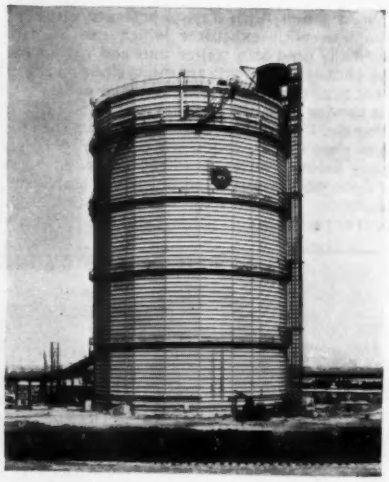

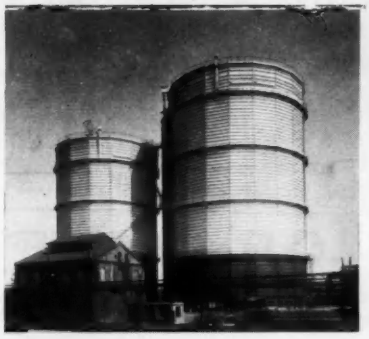

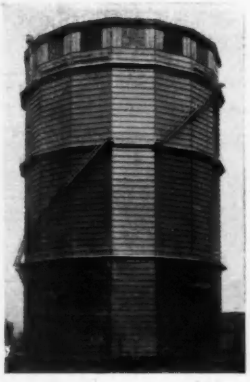

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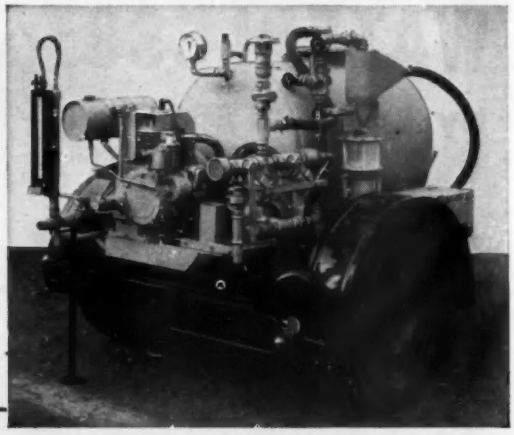
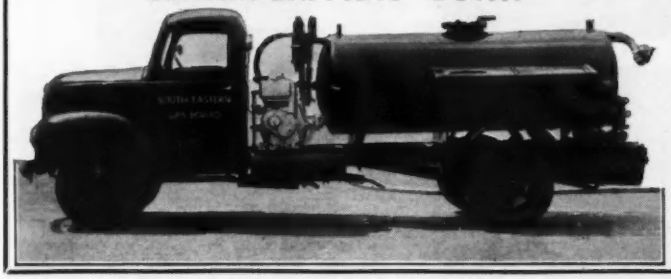
The 75 gallon Allan Taylor pressure/vacuum service cleaning equipment complete with exhauster which can be used for vacuum or pressure. Normally used as a trailer unit and towed by a 10 cwt. van. Visible in the photograph (*right*) are the cyclone and test bar. This additional equipment enables the operator to make pressure tests before and after cleaning the service pipe, the test taps passing 50 cu. ft. or 100 cu. ft. as required. By using the Cyclone the dust drawn from the service pipe is deposited in the sight glass for inspection and can then pass into the easily removable container below. The arrangement further enables the operator at the machine to determine whether or not there has been any success with a cleaning operation. The extractor also prevents the greater part of the rust dust from entering the 75 gallon cylinder.



SYPHON EMPTYING OUTFIT



The Vacuum Syphon Emptying Outfit illustrated is mounted on a 4 ton **Thames** Chassis. A 600 gallon galvanised tank is fitted. A rotary type exhauster is driven by a 4 b.h.p. four-stroke air cooled engine, mounted on a sub-frame behind the cab. The tank is fitted with a flame-proof vent and the outfit can be used for high or low pressure syphon emptying. A large manhole at the rear allows the tank to be cleaned easily. A sight glass is fitted to enable the operator to know when the Syphon is emptied. Twenty-five feet of 1½ in. suction hose is supplied with the outfit. The outfit can be used for vacuum or pressure working.

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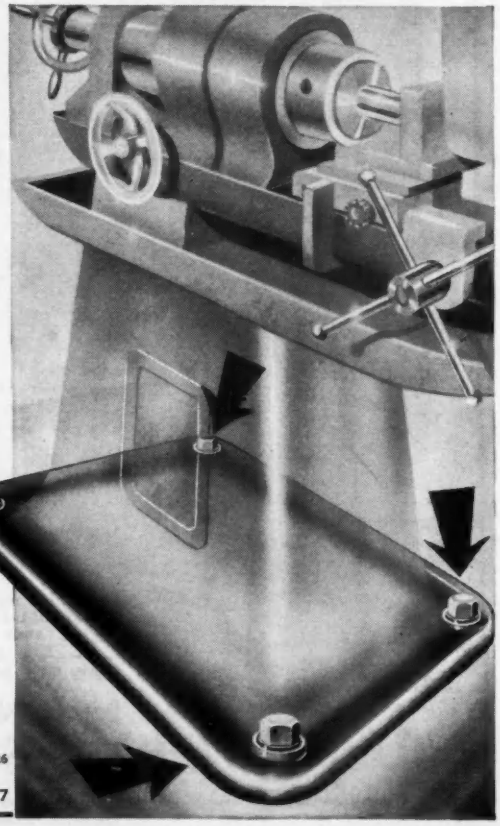

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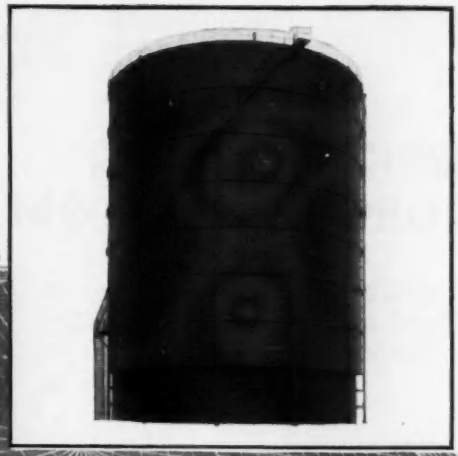
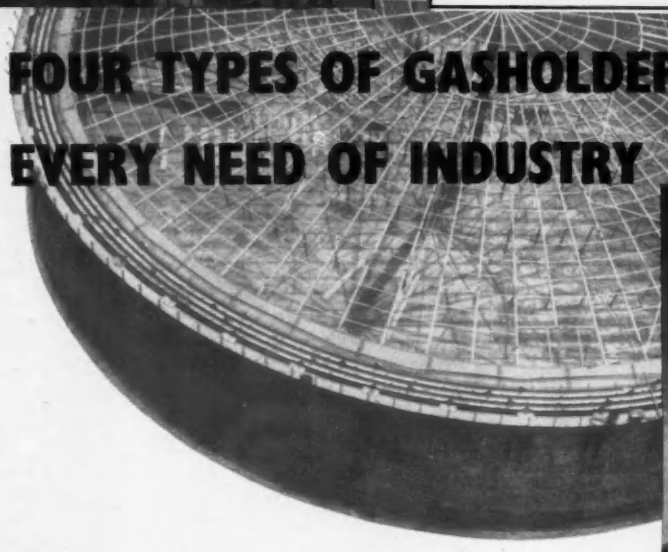
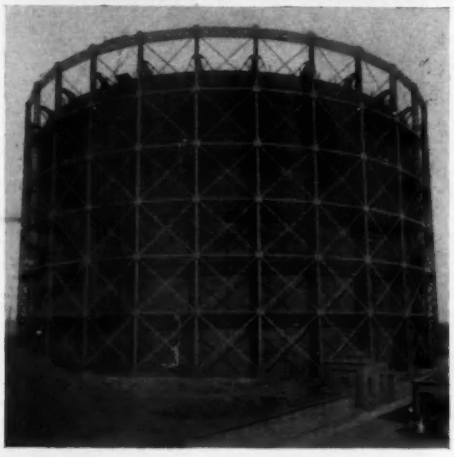


FOUR TYPES OF GASHOLDER WHICH MEET EVERY NEED OF INDUSTRY



The ABP-KLONNE type of gasholder has a dry seal which eliminates the use of tar and incorporates a self-operating system of lubrication controlled by the piston movement. The WIGGINS gasholder is the only one with an absolutely dry frictionless seal; and it does not use water, tar or grease. Operating costs and maintenance problems are, therefore, virtually non-existent. Water-sealed gasholders—both column and spiral guided—can be designed to contain gas in small and large capacities.



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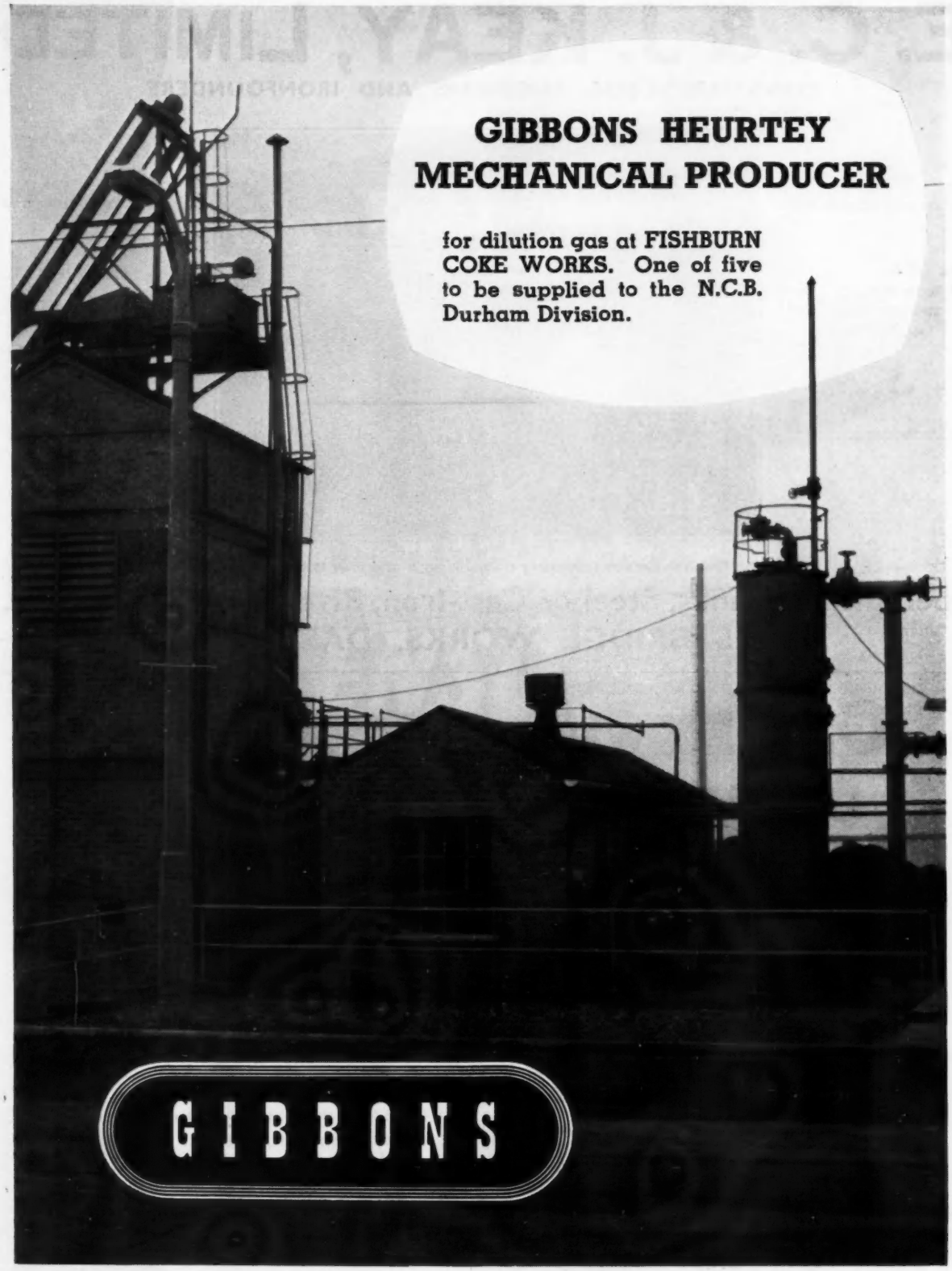
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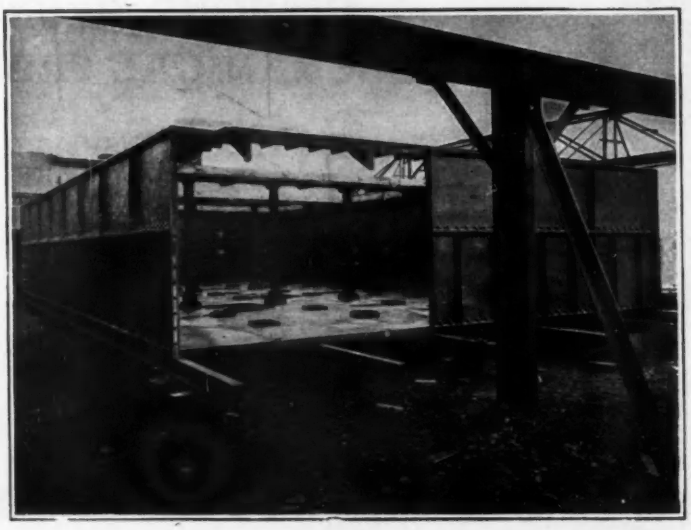

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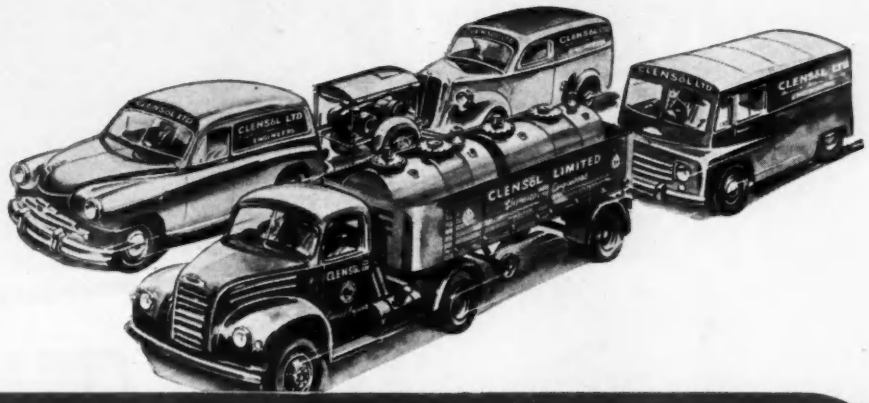

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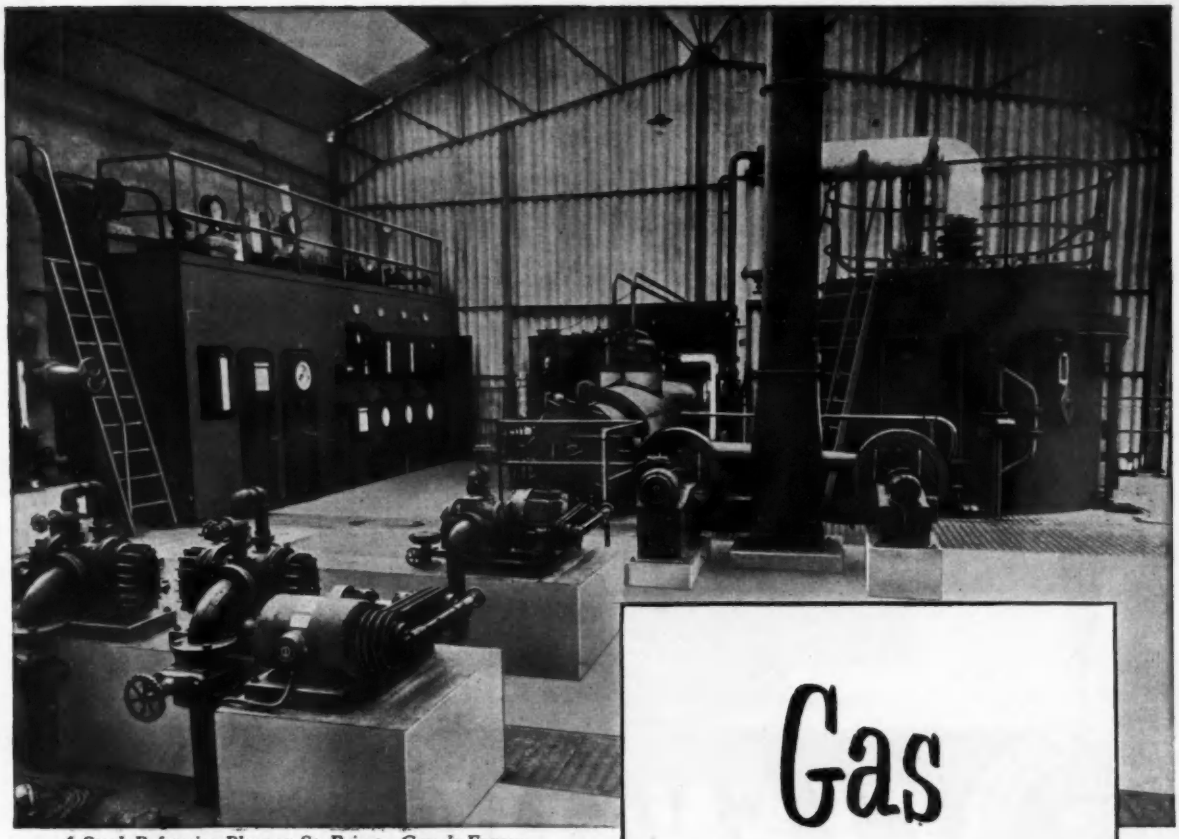

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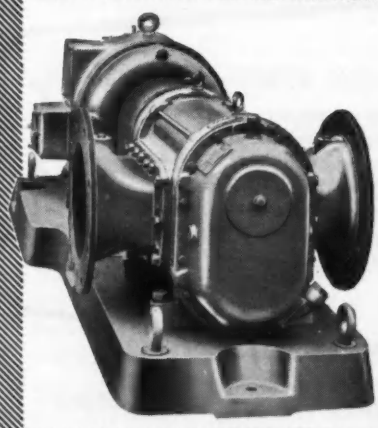

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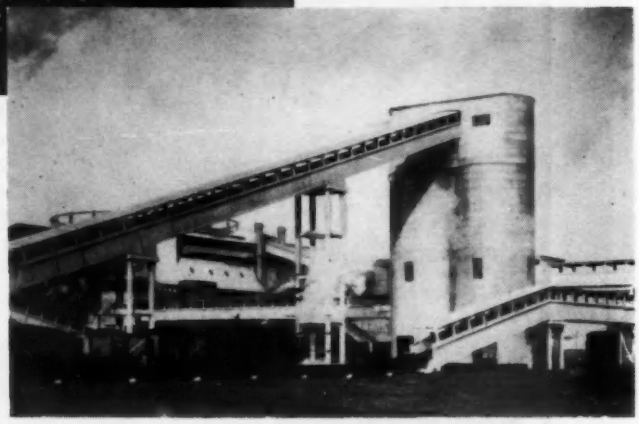

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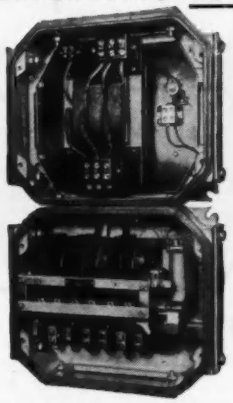

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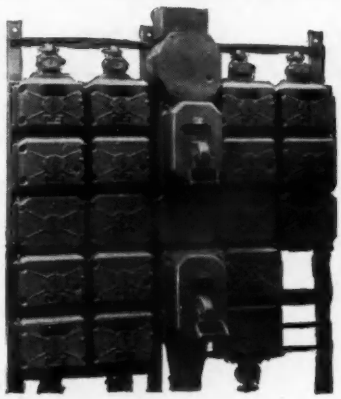

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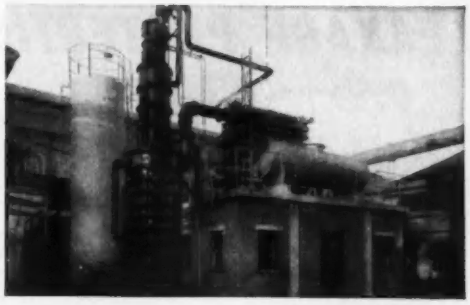

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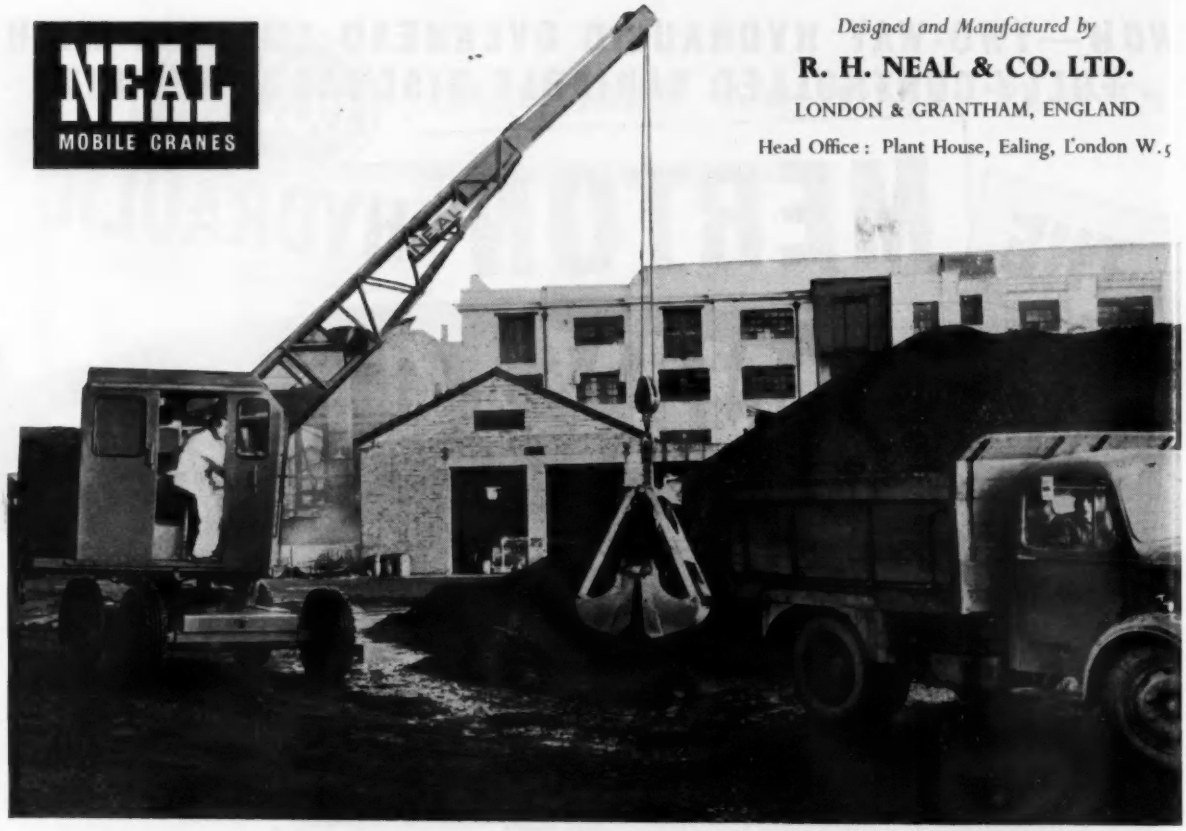

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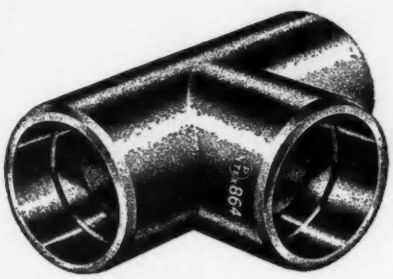

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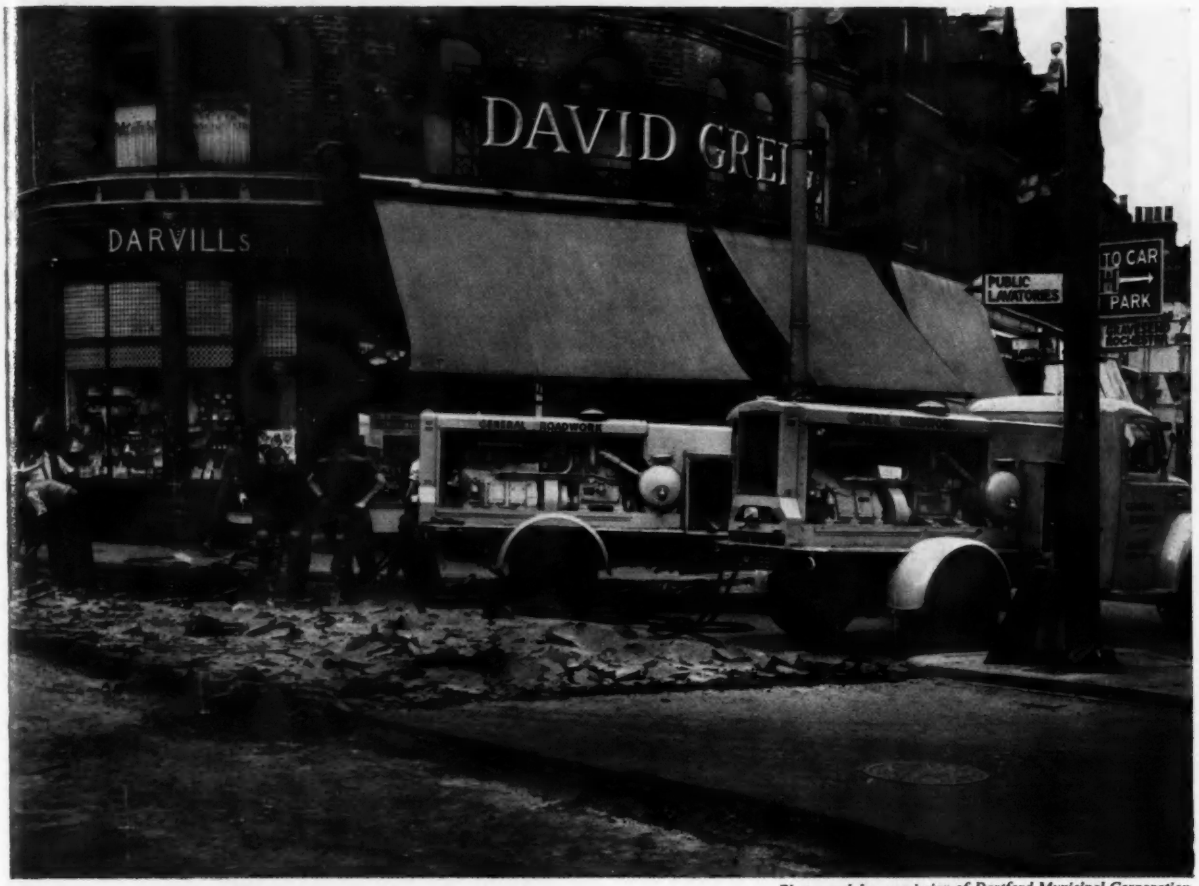

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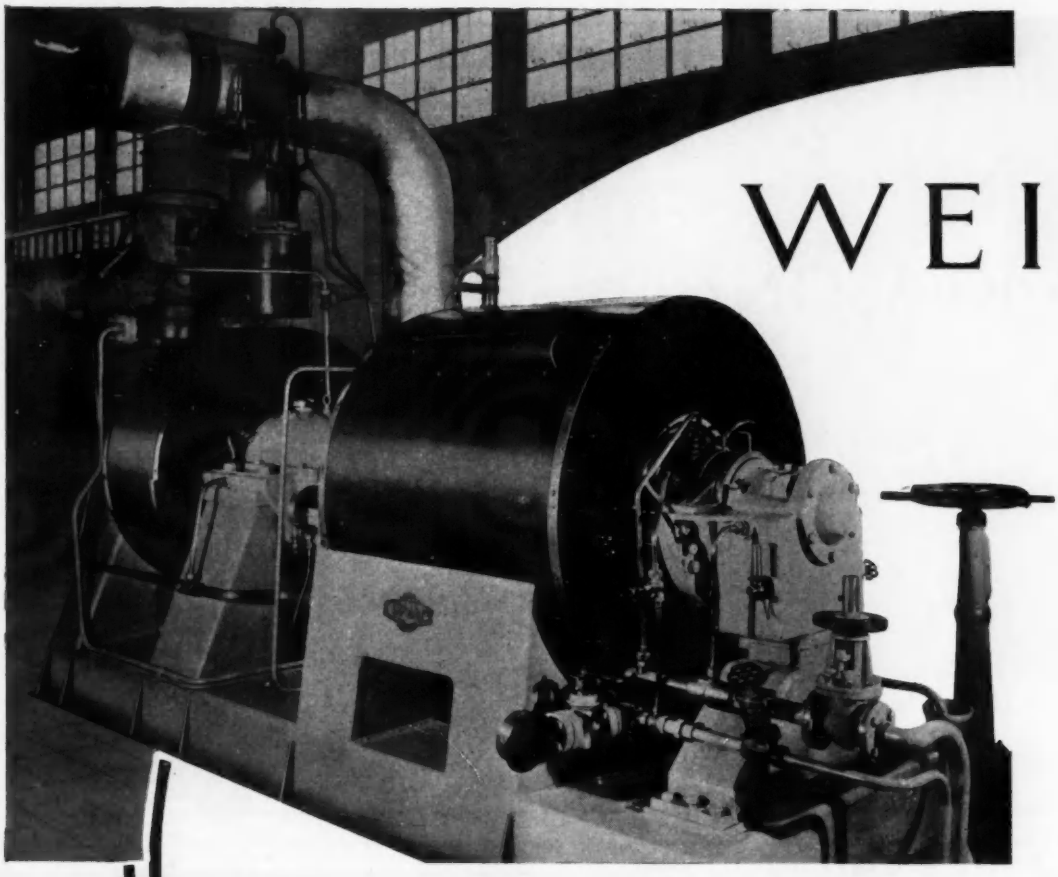

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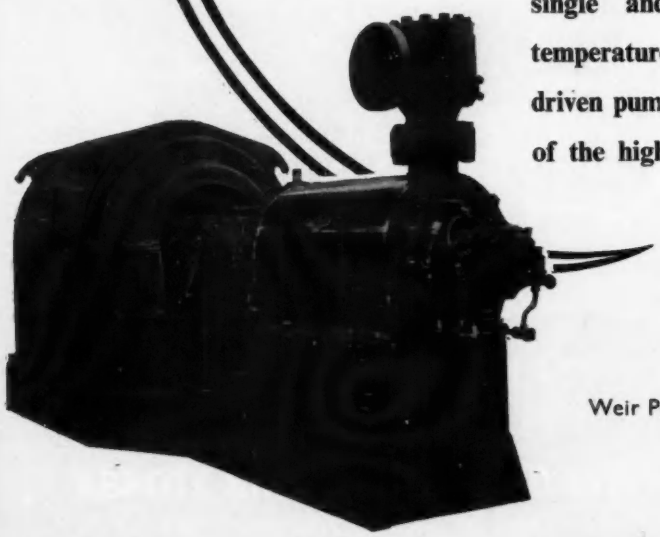

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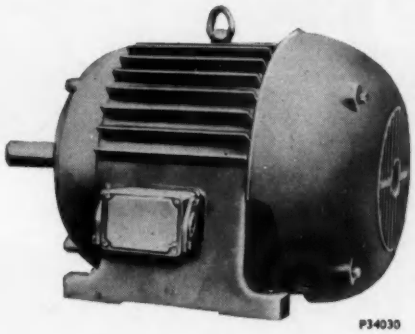

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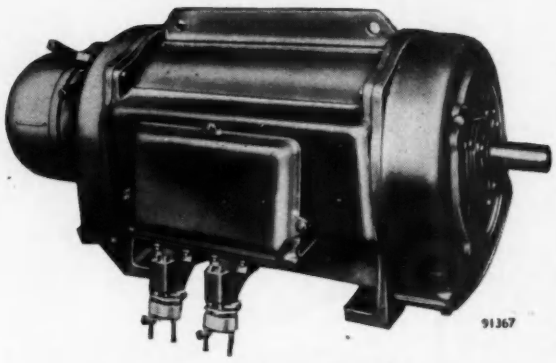

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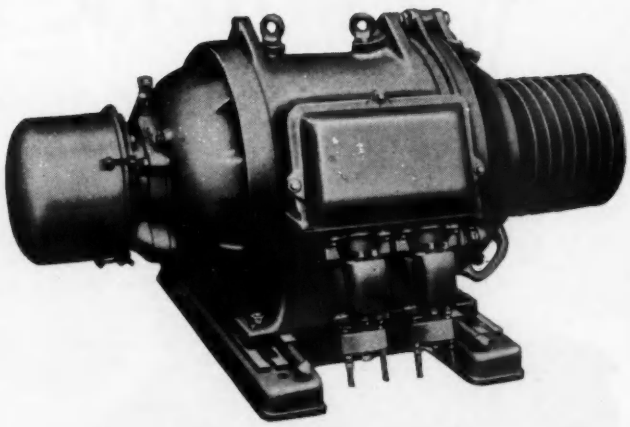

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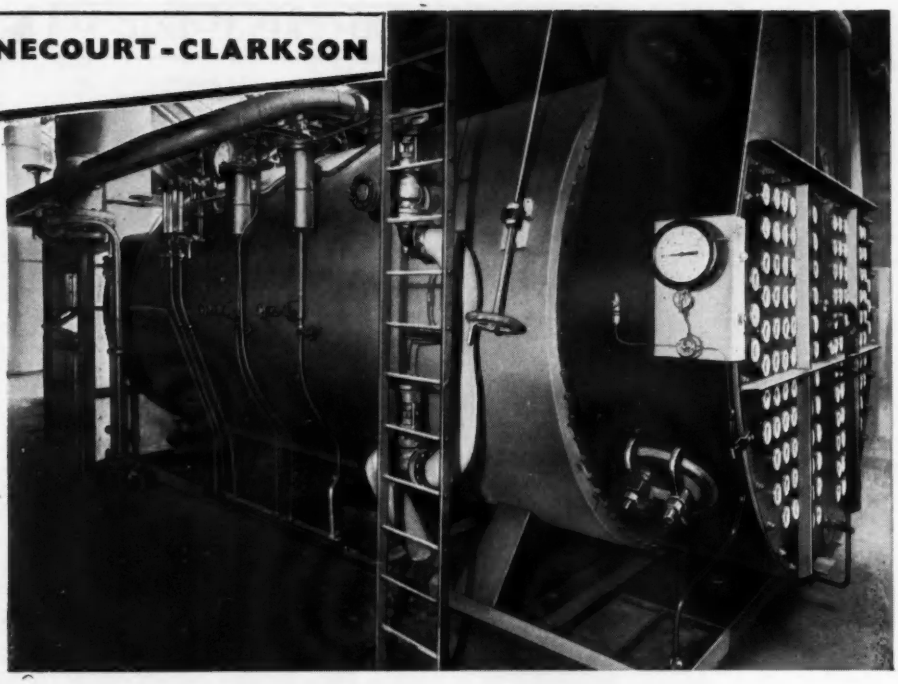

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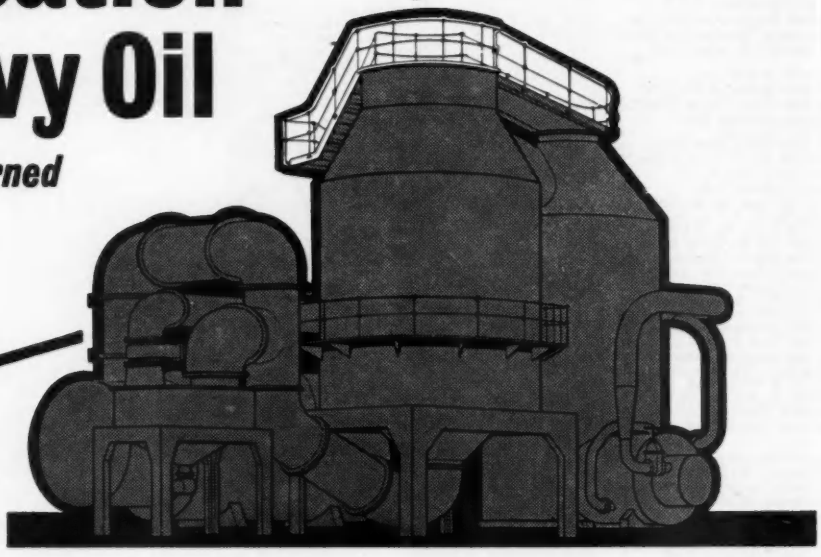

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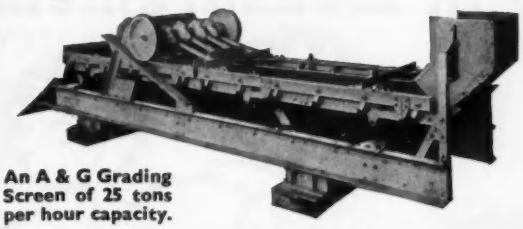

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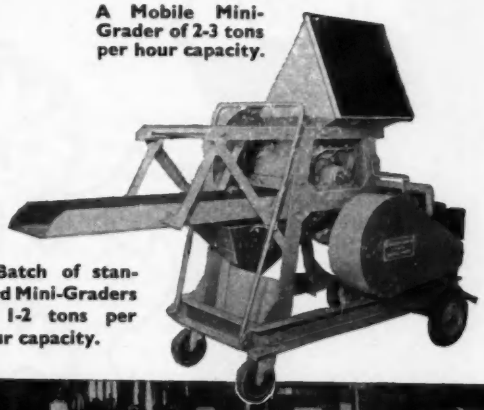
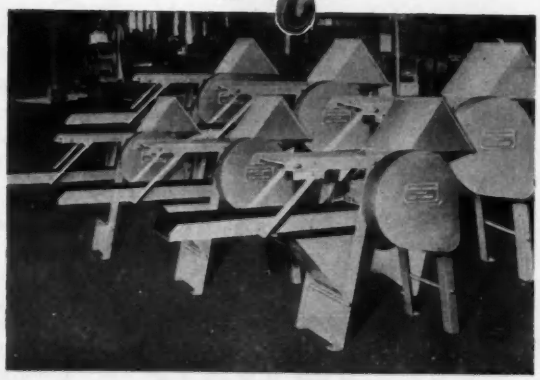
A Mobile Mini-Grader of 2-3 tons per hour capacity.



A Batch of standard Mini-Graders of 1-2 tons per hour capacity.



ALDRIDGE & RANKEN LIMITED
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the last word in gas installations

Gas Journal

VOL. 288 NO. 4865 October 10, 1956

108TH YEAR

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TG25

Gas Journal

VOLUME 288. No. 4865. OCTOBER 10, 1956. 108th YEAR

The Writing on the Wall

NOT the least significant part of the story told by the Gas Council's and area boards' annual reports, published yesterday, was the fact that domestic gas sales have registered a drop, although at 1,350.3 mill. therms they are still above the 1954 figure. On the other hand, industrial sales increased by over 4%, less spectacular perhaps than the 9.3% registered last year, but nevertheless a healthy sign of a growing load. Commercial consumers took just over 5% more. Most important, the total quantity of gas sold during the year was 0.5% up on the previous year. This increase in the quantity of gas sold was confined to eight of the 12 boards, two others showing small reductions and the remaining two a reduction of about 2.5%.

Financially, the year was a satisfactory one, the industry having a net surplus of £531,628, against £2,472,553 in the previous year. Eight boards had a surplus and four (Scottish, Northern, North Thames, and South Western) a deficit.

But it is the evidence and promise of improved efficiency in production which commands attention in the report. A steady annual increase in production efficiency from 74.8 in 1952-53 to 76.8 in 1955-56 is encouraging indeed. As the Gas Council reports, 'good progress' has been made with the gasification of oil projects and particular reference is made to the largest plant now in course of erection, that being built under the agreement between the South Eastern Gas Board and the British Petroleum Co., Ltd., on the Isle of Grain. This plant, which is scheduled for completion in 1958, will of course use the Segas process; its capacity will be 18 mill. cu.ft. a day, but there is room on the site for expansion to 80 mill. The report states that the total capacity of the eight plants at work and the 20 now being erected or on order will be 82 mill. cu.ft. a day, and the oil required for them will be of the order of 310,000 tons a year. It is estimated that the coal saved will be 850,000 tons a year.

Reference is made to the agreements which have been signed between the North Thames Board and the Shell Petroleum Co., Ltd., and between the Southern Board and the Esso Petroleum Co., Ltd., for the supply of substantial quantities of refinery gas from Shellhaven and Fawley respectively, and which have been reported in the 'JOURNAL.' It will be remembered that under its 10-year agreement with the North Thames Board the Shell Company guarantees to supply 25 mill. therms of refinery gas a year, and for this purpose will construct a unit at the Shellhaven refinery to purify and dry the gas. The supply is due to begin from mid-1958. In the case of the agreement between the Southern Board and the Esso Petroleum Company this is also for ten years and it provides for a supply from Fawley of 17 mill. therms a year of refinery gas which, after reforming at Southampton, will give the equivalent of 13 mill. therms of town gas. Apart from savings in coal, gas oil and heavy oil, the scheme will not unduly reduce the amount of coke available for sale—an important point in view of the demand for coke in the area.

The halfway mark has been reached in the Council's search for natural gas and although gas in commercial quantities has not yet been proved, it will be necessary to wait until the end of the five-year period before results can be truly assessed. Particularly interesting is the reference made in the report to the visits which have been made by gas industry experts to the U.S.A. and Russia as part of the investigation into the technical problems involved in the transport of liquefied natural gas.

A sign of the times was the report that more gas was made by carbonisation and less in C.W.G. plant in order to improve coke supplies. Gas bought from coke ovens was substantially increased. Other notable points include a total manufacturing capacity increase by about 25 mill. cu.ft. a day; a drop of 37.6% in the sale of gas and coke appliances; and an increase in the price of gas in ten areas.

Taken all round, the year under review was remark-

able for two things: First, the very considerable change which is taking place in the processes by which we produce gas and coke and their changed emphasis; and secondly, the degree to which the achievements of the year are in the form of long-term plans, revealing how completely and how successfully the industry may mould itself to a future of changed values and needs. Perhaps more than any previous set of annual reports since nationalisation, those of 1955-56 show the writing on the wall and the pattern of future events.

The Ministry's View

THE recent pilgrimage of the Parliamentary Secretary among representative bodies of the fuel and other industries has been 'a good thing.' Mr. David Renton has expressed the views of his Ministry pleasantly yet responsibly, with a commendably entire absence of party politics. So far, however, he appears to have avoided the more technical audiences and occasions where he might have been subjected to question and discussion. No doubt the obvious reason for this is that technical organisations hold their meetings in the autumn and winter months; that is when Parliament is sitting and when a Minister cannot be expected to pledge himself far ahead to keep a definite appointment. Such organisations might do well to arrange each a special meeting in the recess at which the member or his deputy might address them on Government policy relating to fuel, its supply, distribution and utilisation.

For it was evident from Mr. Renton's excellent address to the North Western Fuel Luncheon Club's opening meeting in Manchester on September 26 that the Government has a fuel policy, if only a somewhat negative one. His audience was composed of men engaged in practically every branch of fuel production, processing, and utilisation—coal, gas, electricity, oil—in one of the most important fuel-using districts in the country. But there was no time or opportunity for discussion.

It is clear that the deficiency in coal supplies will have to be covered over the next nine years, to which period Mr. Renton wisely restricted his prophecies, by first oil and then 'oil and atomic power.' He believed that it would be possible to accelerate the original nuclear power programme but that 'the effects of any such speeding-up will make themselves felt after, rather than before, 1960.'

The growing importance of oil is emphasised in the recent report of the oil committee of O.E.E.C. summarised in the *Times* of September 27. Oil consumption in Western Europe rose from 37 mill. tons in 1947 to 100 mill. in 1955, while the crude oil throughput of European refineries rose from 20 mill. to more than 100 mill. in the same period. The Committee emphasises the increasing use of oil as a direct substitute for coal. 'In the last seven years fuel oil consumption has advanced at over twice the rate of petrol consumption.' Our increasing dependence on Middle East oil is shown by the fact that whereas the gross import into Europe from the Western hemisphere only rose from 16 mill. metric tons in 1950 to 21 mill. in 1955; from the Middle East the rise was from 40 to 90 mill. in the same years.

It was in his account of his Ministry's attitude towards the national fuel policy that Mr. Renton was most disappointing. He objected to a definite, planned policy because it would introduce an element of compulsion which he did not like, because the competition between the several industries must not be weakened, because he does not wish to reduce the responsibility of the leaders, and because 'plans imposed from above are liable to error.' There is something in all these objections. Nor are they all entirely absent from the present regime. The allocation of capital, to which Mr. Renton referred later, is not without an element of compulsion, nor does it leave competition entirely free. After the £1,000 mill. for the Coal Board, £300 mill. to electricity, and untold millions to nuclear development, was it quite true to say that the gas industry had 'received about as much capital in recent years as it could use?'

No one wants plans imposed from above, but the instances of co-operation between the several industries —and that is the broad method which should be pursued—given by Mr. Renton are not sufficient evidence of a strong lead on the main issues. After all, the problem of fuel and power is far more homogeneous than some of those confronting some big manufacturing organisations. In such organisations the Board does not interefere in the details of the several departments, but it does insist that there shall be adequate inter-departmental consultation and co-operation to avoid over-lapping and waste. We have called attention to the collaboration in France between coal, gas, and steel in the production of coke, and to that between gas and electricity, when it is a question of domestic and industrial heating. Competition may be healthy enough in general; in some directions it is absurd.

Examples given by Mr. Renton of the Ministry's stimulation of new developments are useful enough, but neither very new nor very impressive. The Gas Council is well, and, indeed, 'gracefully,' out of the projects for underground gasification. Some of the energy expended in these directions might have been better spent in seeing that carbonising coals are used for the production of gas and coke, instead of in simple combustion. In the discouragement of waste and particularly of N.I.F.E.S., the Ministry has a better record, but it still has some way to go in recommending fuel economy in industries where fuel costs are a low percentage of total production costs. And we hope, too, that the Clean Air Act will over the next 15 years stop all the evils arising out of the use of raw bituminous coal in the domestic grate. But if these results are to be achieved there will have to be a great drive to set up the 'smokeless areas' and real co-operation between the coal and gas industries to produce the solid smokeless fuel which, in the first place, will be the principal factor in the replacement of the 'raw bituminous coal burnt by householders in the black areas.'

Why Murdoch House?

IT is said to be a sign of approaching senility when one begins to resent progress. At the ripe age of 108 any misgivings which we may feel about this or that must therefore be suspect. Nevertheless it is sometimes hard to make a distinction between 'progress' and change. The latter is all too often mistaken for the former and this frequently applies to names. When

one has become accustomed to a particular name no change should be undertaken without very good reason. That is why we have some doubts concerning the new label for Gas Industry House—Murdoch House—so christened by the Minister of Fuel and Power on October 2. Is Murdoch House a better name? True, William Murdoch was the 'father' of the gas industry and at last week's ceremony the Minister unveiled a handsome bust presented, very appropriately, by the West Midlands Gas Board. And it will be pleasant to think of this great pioneer keeping an eye on activities at the hub of the industry which grew from his inventive genius.

Gas Industry House—more familiarly, and perhaps affectionately, Gas House—has the overwhelming virtue of being self explanatory. Moreover, most taxi drivers pay us the compliment of knowing where we want to go when we ask for it. Now we shall have to stick to 1, Grosvenor Place. But it was Mr. Aubrey Jones himself who uttered the most crushing condemnation by prefacing his remarks at the unveiling ceremony with the statement that he had never heard of Murdoch!

Personal Notes

MR. E. H. HARMAN, of Leicester, has been re-appointed Deputy Chairman of the East Midlands Gas Board. The Minister of Fuel and Power has also reappointed as part-time members of their respective boards: DAME VERA LAUGHTON-MATHEWS, SIR ROYDEN DASH, D.F.C., and MR. J. YOUNG (South Eastern); MR. J. JONES (Southern); The HON. D. E. HELY-HUTCHINSON (South Western); MR. W. C. KINCAID (Eastern); PROFESSOR F. H. GARNER, O.B.E. (West Midlands).

MR. CHARLES FREDERICK HUEBNER, who has been Chief Buyer for the British Oxgyen Co., Ltd., since 1947, has been elected Chairman of the Purchasing Officers' Association, Mr. Huebner has been a member of the Purchasing Officers' Association since 1932, the year after its formation. He has been Chairman of the London Branch of the Association for two successive years and has also been Treasurer of the National Association.

MR. GEORGE WILLIAM SIMPSON, Senior Technical Clerk with the Sunderland unit of the Northern Gas Board, retired this week after 49 years' service in the gas industry. On behalf of the staff Mr. R. Williamson, Chief District Engineer of the Sunderland Division, presented Mr. Simpson with an armchair.

MR. S. A. HARRIS, MERSEYSIDE'S GAS HISTORIAN, SAYS FAREWELL

FEW people find that their work leads to such a fascinating hobby as that of Mr. Stanley Arthur Harris, Joint Chief Cashier, Liverpool Group, N.W.G.B., who retired on September 26 after 49 years in the gas industry. Mr. Harris is a member of the Historic Society of Lancashire and Cheshire and for more than 20 years has devoted much of his leisure time to research into the history and development of the gas industry on Merseyside.

Mr. Harris joined the Liverpool Gas Fittings Company in 1907 as a junior clerk and moved to the Liverpool Gas Company in 1911. During the first world war he served in the army. Soon after demobilisation, he passed the examinations of the Society of Chartered Secretaries and subsequently became Chief Internal Auditor and in 1946 Chief Cashier of the Liverpool Gas Company.

He started his enquiries into the early history of the Company about the time he became editor of the company's house magazine — *Copartners' Magazine* — in 1932. These yielded interesting copy and provided a regular feature which had a strong following. Mr. Harris relinquished the editorship in 1952, but has continued his research into the progress of the gas industry on Merseyside.

Mr. Harris with Mr. Drake, who made the presentation.

In his retirement, Mr. Harris will devote more time to his work in the Historic Society, of which he is now vice-president, and has started to delve into the architectural history of Liverpool Bluecoat Hospital.

Mr. Harris was held in high esteem by management and staff and at a farewell gathering last week, he received a silver plated tea service, silver salver, fountain pen and book token from Mr. J. G. O. Drake (Group General Manager) who made the presentation on behalf of staff colleagues.

Diary

October 11.—WOMEN'S GAS FEDERATION, SHEFFIELD AND ROTHERHAM DIVISION: Memorial Hall of the City Hall, Sheffield. One-day Divisional Conference. 11 a.m.

October 11. — INCORPORATED PLANT ENGINEERS: Scottish Building Centre, 425-427, Sauchiehall Street, Glasgow, 7.15 p.m.

October 12.—MIDLAND SECTION I.G.E.: Autumn Meeting, Town Hall, Loughborough, 11 a.m. Paper by Mr. D. H. Brown, Area Safety Officer, W.M.G.B.

October 12.—SCOTTISH (WESTERN) JUNIOR GAS ASSOCIATION: Gas Showrooms, 522, Sauchiehall Street, Glasgow, C.2, at 6 p.m.

October 12.—LONDON AND SOUTHERN JUNIORS: Presidential Address, Meyerstein Theatre, Westminster Hospital School of Medicine, Horseferry Road, London, S.W.1. 6.30 p.m.

October 17.—BRITISH COAL UTILISATION RESEARCH ASSOCIATION: Fifth Coal Science Lecture, the Lecture Theatre, Institution of Civil Engineers, Great George Street, S.W.1. 5 p.m.

October 17.—SOUTH WESTERN SECTION, I.G.E.: A.G.M., Bath. 2.30 p.m.

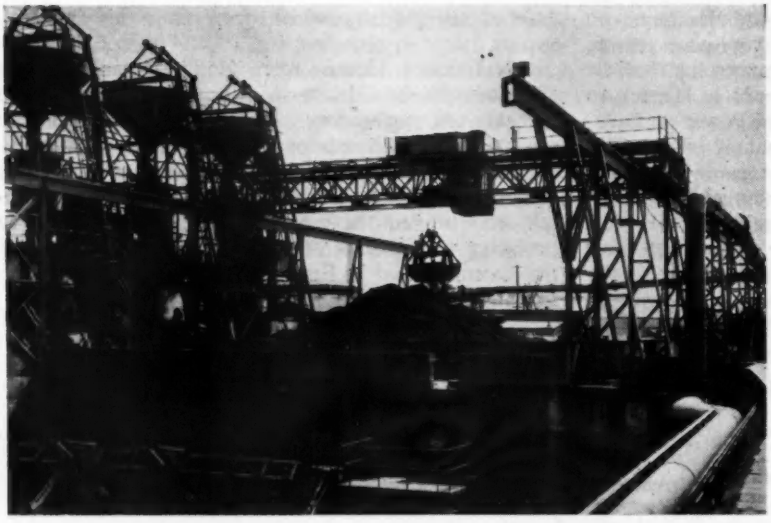
October 18.—NORTHERN JUNIORS GAS ASSOCIATION: Visit to N.C.B. coal washery.

October 19.—MANCHESTER AND DISTRICT SECTION, I.G.E.: Visit to the works of W. C. Holmes and Co., Ltd., Huddersfield, 11 a.m. Ordinary General Meeting 2.45 p.m.

October 19.—INCORPORATED PLANT ENGINEERS, BIRMINGHAM BRANCH: Imperial Hotel, Temple Street. 7.30 p.m.

SAGEM GOLFING SOCIETY

The members of the Sagem Golfing Society who were present at Sunningdale for the Autumn Meeting will be relieved to hear that the prizes which so mysteriously disappeared have now been returned to the Honorary Secretary, and will be used for the Spring Meeting in 1957.



View of the producers now superseded by gas main on right

Changed to Town Gas During Holiday

BOARD CO-OPERATE WITH FIRM

THE Walsall and District Division of the West Midlands Gas Board has recently co-operated with the Birmingham Aluminium Casting Co., Ltd., of Smethwick, on the conversion to town gas of all their producer gas fired equipment.

This conversion has enabled the Company to dispense with the use of their three producer gas plants, and the town gas load for the first week after the conversion was 31,500 therms. Consumption is likely to be increased considerably in the near future when full time working is restored.

Valuable Assistance

The conversion was preceded by detailed surveys, and a considerable amount of investigation and development work was carried out by the Divisional staff, particularly in relation to the type of burner equipment to be used. Such equipment was, in fact, made up by the Company's staff in readiness to effect a quick changeover. The Board's Industrial H.Q. gave valuable assistance in re-designing the reverbatory furnace and provided detailed drawings to enable the work to be executed by the Company's own staff.

1,068 Items

Among the 1,068 items of equipment which had to be converted were holding pot furnaces, self-contained die casting machines, core drying ovens and racks, die heating furnaces and warming stoves, annealing stoves and die hardening furnaces, and driers, numerous torches for lighting and drying, die heating, oil refiners, vats, overhead heaters and many other miscellaneous items.

The Birmingham Aluminium Casting Co. Ltd. had been given an undertaking that the work involved in this conversion would be carried out during the works' annual holiday. The producer plants were shut down on July 27 and work on the scheme began.

Conversion of all the items of plant and equipment was effected by the Company's engineering department, in conjunction with the Divisional staff, and work continued without pause until the changeover was completed, on the afternoon of August 11.

No. 1,000,000

Sales Director of Electrolux, Mr. J. H. R. Homfray, has a quick look in the millionth domestic refrigerator produced by the Luton factory of Electrolux, while Inspector W. Campbell signs his approval. It was a red-letter day for Electrolux Ltd., when they started on their second million. They are the first domestic refrigerator manufacturers in this country to achieve this remarkable production figure.

HOUSEWIVES MUST HAVE LAST WORD

—Says Chairman

'THE Electricity Boards in Scotland are adopting tactics which are designed to exclude gas from new housing estates. But figures of the sales of new gas appliances show that the vast majority of housewives prefer gas,' said Mr. Sydney Smith, Chairman of the Scottish Gas Board, when he spoke to members of Dunfermline branch of the Women's Gas Federation, at the local showrooms on September 27.

'It is entirely wrong,' he said, 'that new tenants of new housing estates should be prevented from having the facilities they prefer. It is an undisputed fact that where freedom of choice is given, more than 80% of housewives prefer gas for cooking and for home laundry.'

Prior Consideration

Mr. Smith asked the members of the Dunfermline branch to impress upon all concerned that the wishes of the housewife in this vital matter should be respected and should even receive prior consideration.

After stating that the requirements of domestic consumers were uppermost in the minds of the Board, Mr. Smith went on to review the progress that had been made in gas appliance design and efficiency during the last 20 or 30 years.

In conclusion, Mr. Smith said that they placed great emphasis on home service and they were taking immediate steps to increase their number of qualified home service advisers in all parts of Scotland.

Everything Possible

They would do everything possible to improve their technical service, with the end in view of ensuring that their customers received the standard of service to which they were fully entitled and which gas and modern gas-burning and coke-burning appliances could provide in meeting the various requirements of the modern home.

OVERSEAS AGENTS FOR J. C. NEVILLE

J. C. Neville Ltd., London, have announced the appointment of agents for the foreign sale of the 'RG' tube cutting and screwing machines and accessories. These are: The Development Services Co., Ltd., South Street, Bagdad, for Iraq; Belcom, Société Belge d'Echanges Commerciaux, 43, Chaussée de Charleroi, Bruxelles, Belgium; John W. Searcy (Rhodesia) (Pty.) Ltd., P.O. Box 1346, Swansea Street, Light Industrial Sites, Bulawayo, Southern Rhodesia, for Northern and Southern Rhodesia and Nyasaland.

Seventh Year Reports and Accounts Reveal that

EIGHT BOARDS SHOW SURPLUSES —AND FOUR HAVE DEFICITS

£319 MILL. INVESTED IN FIXED ASSETS

THE aggregate result of the area boards' operations during the year ended March 31, 1956, was a net surplus of £531,628 on a gross income of £346,071,494, it is revealed in the annual report and accounts of the Gas Council, released yesterday together with the area boards' reports and accounts.

This surplus, which compares with £2,472,553 for 1954-55, is the figure arrived at after charging £20,922,061 for depreciation and amounts written off and £17,104,385 for interest and after the transfer by one Board of £260,000 to taxation equalisation reserve. Eight boards had surpluses and four deficits.

After making adjustments for previous years and bringing in the balances on net revenue accounts at March 31, 1955, all boards but one had disposable surpluses, the net total amounting to £6,044,402. From this sum £1,325,000 has been placed to reserve funds and £975,000 to replacement and obsolescence reserves, leaving £3,744,402 to be carried forward to 1956/57.

In the seven years since the gas industry passed into national ownership £319 mill. has been invested in fixed assets, and of this sum £106 mill. has been found from provisions for depreciation.

During the year capital expenditure on additions to or replacements of fixed assets amounted to £61.2 mill. Of the gross revenue of £346,071,494, approximately £195.5 mill. came from sales of gas, £105.7 mill. from disposal of by-products, £28.5 mill. from sales and hire purchase of appliances and £16.4 mill. from other sources.

On July 14, 1955, the Gas Council issued £100 mill. British Gas 4% guaranteed stock 1969-1972 at £98 per nominal £100. The proceeds of this issue were used in reduction of the Council's liability to the clearing banks, temporary borrowings from which had met the cost of current capital expenditure.

Increased Efficiency

In 1955/56 the industry required the equivalent of some 2 mill. tons of coal less than it would have required at the production efficiency of 1948. Coal gas made per ton of coal carbonised increased from 74.8 therms in 1954/55 to 75.2 therms in 1955/56 (72.5 in calendar year 1948) and overall production efficiency improved from 75.7% in 1954/55 to 76.8% in 1955/56 (71% in 1948).

The numbers employed in the industry continued to fall slightly as a result of the progress of integration schemes and greater efficiency in production methods. On March 31, 1956, the total was 141,918, a reduction of 1,460 during the year.

How They Fared

Board	Net surplus (+) or net deficiency (−) for 1955-1956 after allocation to and from taxation reserves
	£
Scottish	−320,582
Northern	−343,908
North Western	+100,329
North Eastern	+160,192
East Midlands	+ 87,488
West Midlands	+171,355
Wales	+ 25,087
Eastern	+ 56,499
North Thames	−309,338
South Eastern	+928,741
Southern	+ 22,603
South Western	− 46,838
	+531,628

Every Effort

The main increases in costs during the year under review totalled £20,129,000 and are estimated to cost £31,699,000 in a full year. Every attempt has been made to absorb as much as possible of the increased costs, but there have been further increases since the end of the financial year estimated to cost £10,567,000 in a full year. At current levels of output and efficiency the increases in operating costs and capital charges that have taken place from vesting date to March 31, 1956, are broadly estimated to total £135 mill. a year, whereas the additional revenue receivable for a year from increases in charges made during the same period is estimated to approximate to £120 mill. 'Subject to a number of items which it is not possible to evaluate in a general statement, it can therefore be said that the industry has increased its charges by approximately £15 mill. less than the increases in costs,' says the report.

As a result of the increased costs since the end of the financial year, ten boards decided that they must raise the price of gas. The Gas Council announced on June 26, however, that all boards, after making such revisions of price as most of them found necessary to meet increased costs of working as at June 1, 1956, would keep the price of gas unchanged at least until March 31, 1957, unless something quite exceptional and unforeseen occurred.

Capital Expenditure

The Government's measures to restore the balance of payments led to cuts in the industry's capital development programme which meant the deferment of a number of schemes regarded as essential by area gas boards. Capital expenditure for the year was reduced by £3 mill. and a cut of about 12% was made in the programme for 1956-57, leaving the approved figure as £52 mill. 'This inevitably involves a risk that the distribution system in some districts may be overtaxed.'

Total capital expenditure by the industry from vesting date to March 31, 1956, totalled £318.8 mill.; the industry's provision for depreciation during the same period totalled £106.1 mill.

Good progress has been made with the installation of plant for the manufacture of gas from oil. It is estimated that 850,000 tons of coal will be saved in a year by the use of such plants now in operation, under construction and on order. Since the end of the year the North Thames and the Southern Gas Boards have concluded agreements for the supply of 'tail' gases from oil refineries at Shellhaven and Fawley. These agreements are expected to save 365,000 tons of coal a year when in full operation.

Natural Gas

The Council is now half-way through its five-year programme in the search for natural gas in this country. Gas in commercial quantities has not yet been proved, but it will not be possible to assess results until the programme has been completed.

Visits have been made by gas industry experts to the United States and to Russia as part of the investigation into the technical problems involved in the handling and transport of liquefied natural gas.

Research

Extensions have ben made to the London Research Station during the year and the first stage of development at the new Midlands Research Station is nearing completion. Research is being

carried out for the more effective use of gasworks plant and for the design of equipment for gas and coke utilisation.

Industrial Relations

Honours conferred during the year upon those connected with the industry included a Knighthood conferred on the Deputy Chairman of the Council, a C.B.E., an O.B.E. and four M.B.E.'s; and fourteen British Empire Medals for long and meritorious service.

As a result of negotiations on claims for increases of wages and salaries, settlements were reached during the year at an estimated annual cost to the industry of £10,644,000.

As part of the industry's education and training schemes, 4,738 employees attended day or evening classes or took correspondence courses, and a further 4,597 were taking courses in gas fitting. There has been a marked increase in the numbers attending courses in management or business administration, and three further Gas Council residential courses in management and general subjects were held at Brooklands County Technical College.

Domestic and Industrial Development

The effects of hire purchase restrictions were shown by the serious fall in sales of water heaters, wash boilers and cookers. The overall drop in the numbers of gas and coke appliances sold on hire purchase terms was 37.6%, whereas in cash and credit sale the decline was only 3%.

Before the introduction of the Control of Hiring Order 1956, Boards had already decided to restrict the hire of new appliances, primarily to cut down their capital requirements.

Sales of gas for industrial uses rose to more than 750m. therms, an increase of about 4%. Industrial sales now account for nearly 30% of all gas sold.

Gas Production

More gas was made by carbonisation and less in carburetted water gas plant in order to improve coke supplies. There was a substantial increase in the quantities of gas brought from coke ovens.

Of gas made at works, 2,084.9 mill. therms was coal gas, 367.3 mill. therms water gas and 30.8 mill. therms other gas. From coke ovens, 409.9 mill. therms was bought and from oil refineries 8.3 mill. therms.

The increase in coal prices on July 18, 1955, added an average of 12s. 6d. a ton to the gas industry's costs. Since the end of the financial year, there has been another increase adding a further average cost of 6s. a ton.

Coal used in gasmaking totalled 27,841,000 tons and its cost, including transport and handling, was £138,405,665. In recent years the proportion of coal delivered by road has steadily increased, mainly where road transport is cheaper, but also because it is more adaptable to changes in local requirements.

As coal supplies were adequate to allow a full programme of carbonisation, it was possible to increase the availability of coke for sale by more than half a million tons. Sales of coke totalled 11,093,000 tons and of breeze 1,725,000 tons, and stocks of coke at the end of the year were 426,000 tons.

Work is proceeding on the preparation of a draft specification for the quality of domestic coke for consideration by a Committee of the British Standards Institution.

Quantities of chemical products handled were very similar to those in the previous year. There have been remarkable developments in the sale of ammoniacal liquor for use as a fertiliser.

Gas Manufacture and Distribution

Total manufacturing capacity increased by about 25 mill. cu.ft. a day during the year, new plant installed being of a capacity of 105 mill. cu.ft. a day and obsolete or uneconomic plant with a capacity of 80 mill. cu.ft. a day being closed down. Much of the development has been directly associated with integration projects and as a result it was possible to close the record number of 97 works in the year. The number of works operating on March 31, 1956, was 688 compared with 1,050 at vesting date.

The total length of mains on March 31, 1956, was 88,309 miles, an increase of 2,592 miles during the year. The total length of new mains laid was 2,652 miles.

Sales and Consumers

Gas sold during the year totalled 2,648.7 mill. therms, an increase of 0.5%. Industrial sales went up from 720 mill. therms to 751.2 mill. therms, and commercial sales from 375.7 mill. therms to 394.6 mill. therms. Domestic sales, however, fell from 1,378.5 mill. therms to 1,350.3 mill. therms.

The average income per therm of gas sold to consumers was 17.87d., compared with 16.58d. in the previous year. The average price per therm for domestic use was 20.26d. (credit) and 20.73d. (prepayment); for industrial use 13.32d. and for commercial use 17.85d.

The number of consumers rose by 127,195 to 12,792,207, of whom 12,035,484 were domestic consumers, an increase of 120,177.

Area Board Reports and Accounts

SCOTTISH

Good Progress Made Towards Centralisation

DURING the year the Scottish Gas Board have progressed steadily in their policy of replacing and extending plant for the centralisation of gas production on units of economic size and for the closure of small uneconomic works. At the end of the year the number of manufacturing units closed down since vesting date and to which a bulk supply of gas has been provided totalled 40. There has been a substantial reduction in the labour force and improvements in operational techniques. There have been many adverse factors such as increased costs of coal, freight, and wages and salaries; and on account of the economic controls imposed, a substantial decrease in the sales of appliances.

The gross income of the Board amounted to £27,130,901 and represents an increase on the previous year of £1,195,317 notwithstanding a decrease in 'Other Income from Consumers' of £1,000,405, which was due chiefly to hire-purchase restrictions.

The price of gas was increased during the year by 2½d. per therm on the first block, 2d. on the second block, and 1½d. on the other blocks of the tariff.

The gross expenditure, £27,451,483, rose by £1,904,773, the increased expenditure for coal and other production materials accounting for £1,561,614 of this sum. The deficit of £320,582 on the year's trading compares with a surplus of £388,874 for the previous year, a worsening of £709,456.

The total value of appliances sold was £1,587,981 compared with £2,451,402 for the previous year. This serious drop was due, without doubt, to the economic controls imposed during the year to deter potential purchasers of modern domestic equipment.

Projects have been approved and are now in hand which provide for the closure of a further 23 gas works. Considerable progress has been made on the Edinburgh and Lothians grid scheme with the completion during the year of a section of 12-inch diameter main linking Dalkeith with existing mains to the south-east of Edinburgh. The Falkirk and district gas grid has been substantially completed.

In the Glasgow and Lanarkshire Divisions where there will be major changes in the pattern of gas manufacture and distribution, several schemes have been considered in detail during the year: Much will depend, however, upon the availability of gas from various coke oven installations owned by private enterprise. Several sections of the mains in the Lanarkshire grid have been, and are being, enlarged principally between Uddingston and Blantyre. Greenock and Paisley are now interlinked and a number of small works in Renfrewshire and north Ayrshire have been closed.

Two new benches of continuous vertical retorts at Edinburgh came into operation during the year. Large new installations of continuous vertical retorts were

completed and put to work at Falkirk and Glasgow (Tradeston works). A new carburetted water gas plant was completed at Stirling with a capacity of one mill. cu.ft. per day, and major modifications were carried out on two large carburetted water gas plants at Edinburgh.

Boosting plant was installed at several places, particularly at the Helen Street Holder Station, Glasgow, where three boosters, each having a capacity of 250,000 cu.ft. per hour, were installed. A number of other schemes are in progress and others authorised.

There was considerable expenditure on a number of projects which were started during the year, including the new vertical retort installations at Aberdeen, Dumfries, Glasgow and Kilmarnock the reconstruction of a large bench of continuous vertical retorts at Edinburgh; the construction of carburetted water gas plants at Edinburgh; and on the provision of ancillary plant at 12 undertakings.

Eight new gasholders have been put into commission during the year. In addition, two new gasholders each of three mill. cu.ft. capacity were also completed but were not put into commission as work on the connections thereto was still in progress. Construction of a further three holders continues, and a contract was placed for the erection of a holder of 2 mill. cu.ft. capacity.

NORTH WESTERN

New Smokeless Fuels Produced

A NET trading surplus of £100,329 is reported for the year ended March 31, 1956, by the North Western Gas Board, second largest of the 12 boards; this compares with £1,027,784 reported for the previous year. Amendments to local rates for several years and other minor adjustments add £278,208 to this surplus, bringing the total to £378,537. With the sum of £436,658 brought forward from the previous year the disposable balance is £815,195.

Of this £200,000 has been added to obsolescence account, bringing this to £400,000, and £200,000 has been added to reserve fund, bringing this to a total of £1,000,000. The balance carried forward is £415,195.

During the year the Board sold 356,081,000 therms of gas, which was only 1,196,000 therms more than in the previous year. That there was any increase at all was due to the greater use of gas in industry where sales were nearly 7 mill. therms, or 6¼% greater than in 1954-55. Sales to domestic consumers were 4½ mill. therms, or some 2¼% less than in the previous year.

Of the total gas sold domestic consumers took 49%, industrial consumers 31%, commercial consumers 16% and public authorities 4%.

Coke sales at 1,632,000 tons were 95,000 tons less than in the previous year. Of the total quantity sold inland sales accounted for 1,512,000 tons (59,000 tons down) and export 120,000 tons (36,000 tons down). Norway, Denmark, and Ireland were the chief export customers. Coke stocks at the year end amounted to 58,000 tons compared with 18,000 tons a year previously.

Sales of appliances were heavily down and totalled £3,111,252 in value (cash, credit, and hire-purchase) against £4,936,502. The fall was due to the new restrictions on sales by hire-purchase.

However, the number of gas consumers in the Board's area increased by 10,916 to a total of 1,810,939 during the year. Domestic consumers increased by 11,579 to a total of 1,697,636, although the average consumption of gas per domestic consumer fell by nearly 3½ therms to 103 therms per annum.

During the year gas prices, which had been held stable for 2½ years, had to be increased by 1.75d. per therm to meet additional costs (amounting to about £3 mill. in a full year). The average price realised per therm of gas sold was 17.44d. per therm compared with 16.55d. per therm in the previous year.

Coal carbonised during the year amounted to 4,182,569 tons against 4,086,273 tons in the previous year. The average cost was 95s. 4d. per ton compared with 85s. 6d. per ton. From each ton of coal carbonised the average yield of gas was 79.3 therms (.05 therms down) and the average yield of coke and breeze was 11 cwt. (0.12 cwts. up). There was an improvement of .79% in overall thermal efficiency of production which reached the high figure of 77.25%.

The number of employees at the year-end was 18,910, a reduction over the year of 307. Since 1949-50 overall productivity has shown an improvement of 18 per cent. and productivity in manufacture, considered alone, has improved by no less than 31%.

During the year eight uneconomic production stations were closed down, although the available plant capacity at the year-end was 40 mill. cu.ft. per day more than at vesting date.

Some 245 miles of new main were laid during the year and by the opening of a main through the Mersey Tunnel the last westerly link was completed in the Lancashire-Cheshire gas grid which now embraces some 10,000 miles of mains stretching from Glossop to Hoylake and from Barnoldswick to Sandbach. It is now possible to co-ordinate production and supply within and between seven of the Board's ten groups as a result of interlinkage, and two control units have been established.

The Board reports successful progress with the development of two entirely new types of smokeless fuel: A carbonised briquette made from blended coals, and a quickly ignitible refined coal produced by low temperature carbonisation in conjunction with the Board's 'Rochdale' process. Both these fuels are designed for production in continuous vertical retorts. It is hoped to market the low temperature refined coal in the not too distant future.

NORTH EASTERN

Strikes Add Substantially to Coal Costs

EMERGENCY transport arrangements and increased purchases from Durham collieries to meet dislocation in coal supplies caused by strikes during the year under review added substantially to the coal costs of the North Eastern Gas Board. Also increases in rail charges and pithead coal prices raised the coal bill by some £992,000 p.a.

The accounts of the Board disclose a surplus of £160,192 for the year. The Board have placed £200,000 to the reserve fund with £242,545 carried forward. Just over 148,504,000 therms of gas were sold giving an income of £11,088,033, sales of by-products yielded £5,418,716 and appliances £1,364,903. The average price realised per therm was 17.92d.

Gross revenue was £18,208,290 of which 60.89% came from the sale of gas, 29.76% from the disposal of by-products and 7.50% from the sale and hire purchase of appliances.

Gross expenditure was £18,048,098 of which gas manufacture and purchase accounted for 59.02%, distribution and consumer service for 10.32%, sales and hire purchase of appliances for 7.75%.

Hire purchase restrictions and a further increase in purchase tax had such an effect that income from appliance sales decreased by 27% compared with the previous year. Coke inland sales, however, slightly exceeded those of last year.

During the year the manufacturing capacity of the works at Tingley increased to 14 mill. cu.ft. per day, while five manufacturing stations were closed down bringing the number of stations which have discontinued gas manufacture since May 1, 1949, to 28.

Authorised new capital projects on manufacture, distribution, and storage of gas amounted to £1,334,840.

The Gastechnik pelleted oxide purifiers at Royston are now operating and purifying additional quantities of crude gas from New Monckton Coke Ovens.

During the year 181.2 miles of new mains were laid or relaid at a cost of £996,983, and the total mileage of mains increased by 171 to 7,031. The extension of the grid system along the Calder Valley has been completed with the exception of the link with Halifax. The scheme of integration along the Aire Valley proceeds, while the laying of the link main, connecting the grid system to York, is making satisfactory progress. The 'Segas' catalytic oil cracking plant at York has worked almost continuously as a base load production unit.

Commercial development was seriously affected by price increases of home produced raw materials and labour and by restrictions on selling imposed by the Government. Additional purchase tax on gas appliances has worsened the sales position *vis-à-vis* solid fuel and oil burning appliances which are free from this tax.

SOUTH EASTERN

Gas Cookers Chosen in 88% of New Houses

OF the new houses and flats completed in the South Eastern Gas Board Area during the year, 93% were equipped with a gas supply, and of these, 88% chose gas cookers. The total number of consumers supplied at the end of the year—1,549,597—showed an increase of 19,236 compared with the year before.

Costs rose steeply during the year; an increase of 18% in the price of coal in July, 1955, raised the Board's annual coal bill by about £2,500,000 and salary and wage rates had to be put up. The Board were able to offset these extra costs to some extent by economies on the manufacturing side resulting from their policy of concentrating gas manufacture at the most efficient works, and by re-organisation and increased efficiency of customer service arrangements, but the flat rate price of gas had to be increased by 2d. a therm from August 8, 1955. Increases were also authorised in the price of coke.

The new prices were fixed to provide a margin of revenue over expenditure so that there would be a cushion against increased costs in the future. The surplus of income over expenditure on the year's trading was £928,741 out of a gross turnover of £47,934,566.

Industry used 4.3% more gas compared with the previous year and commercial users 1.4% more. Sales to domestic consumers were 1.5% down. Over-all sales of gas, therefore, were 0.4% lower than in the previous year. This was partly due to a reduction in public lighting by gas and partly to the higher average temperature experienced in 1955-56.

Further restrictions on hire purchase sales imposed in July, 1955, and in February, 1956, and the increases in purchase tax in October, 1955, inevitably depressed sales of appliances. However, more than 77,000 gas cookers were sold (21% less than the previous year) and some 30,000 water heaters (36% less).

More gas fires were sold during the year, however. New and improved designs of greater efficiency were introduced, and the gas industry is now well placed to supply the growing demand for a clean source of heat on tap in the home.

A new domestic two-part tariff was introduced to encourage the use of gas in the home, particularly for space heating and water heating. This allows both credit and prepayment customers to take gas at a discount of 25% off the flat rate after paying a standing charge of 26s. a quarter. The Board have also standardised the various prepayment supplements which had existed since vesting date. A charge of 2d. a therm is now limited to three therms a week, and no customer is called upon to pay more than 6d. a week for the services specified.

The Board have played an active part in promoting safety in the home. With the help of meter readers and collectors, lists of old people living on their own have been obtained, and experienced representatives of the Board have called to see that gas appliances are in good order and, where necessary, have given advice on their use.

During the year, 311,516,011 therms of gas were made, compared with 310,883,692 in the previous year. February's cold spell made heavy demands on gas, and on February 2 a record day's output of 274.5 mill. cu.ft. was distributed.

The value of the South London grid main, which was completed during the year, and which enables all the big gasworks in the South London area to work together as one flexible unit, was proved in these severe conditions, and full supplies were maintained.

There were 47 gasworks in the Board's area on March 31, 1956, compared with 67 at vesting day. About 70% of the total gas production is now concentrated at 11 works. At East Greenwich, the Board's largest manufacturing station, a fourth battery of coke ovens was brought into operation during the year. This gasworks can now make 72 mill. cu.ft. of gas every day. At Dover, the first section of the new gasworks came into operation in May. This works, which will eventually be able to produce 17 mill. cu.ft. of gas a day, will be the main source of supply to East Kent. An agreement with the British Petroleum Co. Ltd., was signed, and plant to make gas from oil is to be built alongside the Company's Isle of Grain oil refinery in Kent; work on the site began in February.

During the year, 234 miles of gas mains were laid, making the total length of mains in use 10,092 miles. Mains from Esher to Guildford and from Esher to Walton-on-Thames have now been completed. In Kent, the first part of the 74 miles of new main to link the Isle of Grain project to the Board's distribution system was laid. In Sussex, the gas mains from Black Rock, Brighton, to Lewes and from Lewes to Uckfield were completed, and the small gasworks at Lewes and Uckfield were closed down.

EAST MIDLANDS

Record Outputs of Gas Again Achieved

DURING the early months of the year under review record outputs of gas were again achieved by the East Midlands Gas Board. In the Sheffield and Rotherham Division the maximum week's consumption showed an increase of nearly 5% over the previous winter. In the Notts nad Derby Division the corresponding figure was 3.2%, while in the Leicester and Northants Division it was 3.2%, and in the Lincolnshire Division nearly 4.1%.

Except in the Sheffield and Rotherham Division, full supplies were maintained throughout the cold weather, while the total yield of coke and breeze from the carbonising plants increased from 11.07 cwts. to 11.22 cwts. per ton of coal carbonised.

However, the financial year was not an easy one. Despite advances in sales of gas and coke (gas sales amounted to £16,209,942), sales of appliances were severely hampered by increases in purchase tax and by successive hire-purchase restrictions, and there were further heavy increases in the costs of coal, coke oven gas, wages and salaries, and freight. The sharp drop in the sales of appliances is reflected in the considerably decreased contribution made by these sales to the cost of consumer service. The increases in costs necessitated an adjustment of tariffs and the year finally ended with a small surplus of £87,488 after providing £1,754,894 for depreciation and £1,401,031 for interest charges.

The Board made available almost 64,000 mill. cu.ft. of gas. Over half of this was coke oven gas purchased in bulk and purified before re-sale. To produce the remainder of the gas the Board carbonised 1,711,118 tons of coal and gasified over 9 mill. gallons of gas oil.

Additional carbonising plants were brought into commission at Car House works, Rotherham, and Litchurch works, Derby. At Car House works, Rotherham, the first section of the new intermittent vertical chamber plant went to work in December, and the other three sections followed between that time and the beginning of April. Work continues on the extension.

Extensions to retort houses were completed at Grimsby, Gainsborough, and Scunthorpe, and work is proceeding on the new installation of horizontal chamber ovens at Neepsend works, Sheffield.

During the year 17 works ceased manufacture and are now receiving gas from the grid systems. This brings the total of works closed to 56 since vesting date.

On the distribution side, the 'backbone' main and its various branches is nearly complete. About half of the North Lincolnshire grid is now in operation and it is expected that the full scheme will be completed in the immediate future. The net increase in mains laid during the year was 404 miles. The net increase in the number of services laid was 24,747.

To meet the rapidly increasing load in Sheffield, two catalytic oil gas plants have been ordered for installation at the Meadow Hall works in Sheffield. Two similar plants are also to be installed at Northampton. Plans are being prepared for completing the final link of the 'backbone' main between Sheffield and Chesterfield. The main will then run without interruption from Doncaster in the North to Northampton in the South and integrate the three main Divisions.

NORTH THAMES

Deferred Price Rise Caused £321,756 Deficit

A TOTAL deficit of £321,756 (net £309,338), when deducted from the net revenue account balance at March 31, 1955, of £564,491 leaves a balance of £242,735 to be carried forward in the North Thames Gas Board's accounts.

When the Board raised the price of gas by 1¼d. per therm in June, 1955, this was the first increase since February, 1952—and they feel that to peg the price of gas for over three years was an achievement of which they could feel proud. But the rise of 12s. 6d. per ton in the cost of coal forced them once more to raise the price of gas—on October 1, 1955—by 1d. per therm. But it was because they had deferred the rise in price for so long in the first place that the deficit was incurred.

Despite the effects of hire purchase restrictions and higher purchase tax, business was not discouraging; appliance sales were fewer, but sales of gas passed last year's record total. Once again, more than 80 out of every 100 housewives in the new dwellings completed in the Board's area during the year chose gas for cooking. The millionth additional gas appliance since vesting day was sold.

During the year, the replacement of obsolete plant by new equipment resulted in a fall of total coal gas plant from a rated capacity of 237.65 mill. cu.ft. per day to 233.35 mill. cu.ft., and a rise in the rated capacity of other types of plant from 166.75 mill. cu.ft. per day to 169.75 mill. cu.ft.

Although the coal received was poorer in quality, the efficiency of gas production was again raised, thus saving about £35,000 worth of coal. The efficiency of oil gasification was also raised, by 1.5%; a saving of about £25,000 a year.

The Board continued to replace out-of-date plant with new and more efficient gasmaking units. As part of this policy, gas making ceased at Staines works after 122 years, and the district is now supplied by the grid. This represents a saving of about £55,000 per annum. Most interesting of new plant put to work during the year was the first Gas Integrale unit at Kensal Green, which is designed for the complete gasification of graded non-coking coal. Though its installed capacity is 2 mill. cu.ft. per day, it was by the end of the year successfully producing up to 2.6 mill. cu.ft. per day.

In order to achieve more economic working, special equipment is being introduced so that isolated gasholder and pumping stations can be worked by remote control. The Board pushed on with its programme of installing at strategical points gasholders to meet the increasing load, but shortage of steel resulted in disappointing delays.

The Board realised that, to meet future demands for coke, the supplies of its raw material must be expanded. In collaboration with the National Coal Board, therefore, low rank coals were carbonised under test conditions; at first on a small scale, but latterly in quantities of 400/500 tons a day. These tests demonstrated the possibility of incorporating in the Board's coal carbonising programme the production from low rank coals of an easily lit and free burning coke for open fires. This investigation into ways of increasing supplies of domestic coke is being continued by seeing whether the type of coke produced in existing static carbonising plant can be made more suitable for open fires also.

Further improvements were made in the removal of organic sulphur from the gas before distribution. The average organic sulphur content during the year was 16.7 grains per 100 cu.ft. as compared with 20.7 in 1949/50.

Demand for most of the Board's main by-products was steady and sales of gas were slightly larger (by .23%) than last year's record total. The total number of consumers increased by 16,908 and now stands at 1,873,975.

Coke available for sale to the public once more exceeded 2 mill. tons, with an increase of 6% on last year. However, owing partly to reductions in export quotas and partly to the shorter duration of cold weather in the winter 1955/56, sales were down by 4%.

SOUTH WESTERN

Most Difficult Year Since Vesting Date

TRADING conditions during the year under review were perhaps the most difficult the South Western Gas Board has had to face since vesting date. There were major increases in the cost of coal, labour, and materials generally, while increasingly severe restrictions on hire purchase trading seriously affected the sale and installation of gas appliances of all kinds, and the particularly fine weather of the summer of 1955 and the relatively dry winter were not conducive to the increased use of gas by domestic consumers. On the other hand there was a continued and substantial increase in the sale of gas to industrial and commercial consumers, and the achievement of further progress towards an improved organisation and greater productivity.

That the increase in the Board's price of gas effected in June was no more than justified is seen from the accounts for the year which show a small trading loss of £46,838. Fortunately, certain long outstanding negotiations were settled advantageously during the year with the result that there was additional income 'relating to prior years' of £142,366 which, when set off against the trading loss, enabled the Board to transfer £50,000 to Reserve Fund and to increase the balance carried forward on Net Revenue Account by a similar sum to a total of £118,355.

Since vesting date gas sold per employee has been increased by 16%, coke sold per employee by 30%, coal gas made per ton of coal carbonised by 6%, and coke and breeze produced per ton of coal carbonised by 9%.

Experience has proved the Board's ability to give uniformly ample supplies of gas during very cold weather, as a result of integration and, furthermore, the financial benefits accruing from such integration have exceeded the original estimates. The combined effect of these improved efficiencies and increased productivity has been to save approximately 2d. per therm of gas sold.

The Board's general programme of capital expenditure was reviewed by the Minister who approved the programme for 1956/57 and gave provisional approval, subject to annual review, for the three ensuing years in respect of which some major commitments had necessarily to be incurred in advance.

Three processes for the manufacture of gas from oil and one process for the complete gasification of coal are being developed in order to make the best possible use of the quantities and qualities of coal available to the Board and avoid the need to carbonise additional coal to meet the increasing demand for gas. These plants will reduce the costs of gas manufacture and meet peak load demands economically, whilst the capital expenditure involved is relatively low.

The Board has in mind the need to produce increased quantities of coke to augment the supplies of smokeless fuels which the Clean Air Act will require to be available. To this end experiments have been made during the past year at one station with the heating of retorts during the summer by gas, to release the maximum quantity of coke for the winter demand. This operation keeps the plant at near optimum output during the whole year. The results of this experiment have been so successful that the process has been extended to other works.

At Stapleton Road works, Bristol, the final 2½ mill. cu.ft. per day section of the new 10 mill. cu.ft. per day continuous vertical retort installation was commissioned in October, 1955, and work on the 6 mill. cu.ft. capacity all welded gasholder, the largest of its type in Europe, has progressed satisfactorily throughout the year.

At Gloucester good progress is being maintained on the works development which includes an additional Jones gas plant, a complete coal gasification plant and two oil gasification plants.

At the Cheltenham works the erection of a new gasholder is within a few months of completion. A pilot proving plant for the treatment of carbon paste from the existing Jones gas plant has been installed in order to investigate the possibilities of making carbon paste a marketable product for the rubber industry at home and abroad.

Work in connection with the reconstruction of the Exeter works is proceeding satisfactorily.

SOUTHERN

Good Progress Made Towards Integration

THE completion of the Southern Gas Board's seventh year saw material progress in the plans for integration; three more of the smaller and less efficient works were closed, making a total of 23 since vesting day. Substantial improvements were made in distribution systems and a start made on the demolition of the Oxford North Bank works. However, on the commercial side, sales of gas showed only a small increase on the previous year, while sales of appliances were seriously affected by hire purchase restrictions.

The net surplus for the year was £22,603, after transfering £260,000 to Taxation Equalisation Reserve. After adding an adjustment of £177,919 in respect of previous years' figures (mainly resulting from alterations to the Board's rating assessments for the years 1952 to 1955 following the passing of the Rating and Valuation (Miscellaneous Provisions) Act, 1955), adding £109,262 (the credit balance of the Revenue Account at the beginning of the year), and deducting transfers of £125,000 and £100,000 to Reserve Fund and Replacement and Obsolescence Reserve respectively, the amount carried forward to next year's accounts was £84,784.

The preliminary work on the site of the new Cowley gasworks proceeded according to schedule until January, 1956, when, in deference to the general wishes of the Government that capital expenditure should be curtailed, the relevant factors were examined and steps taken to slow down work on this particular project, bearing in mind the need to safeguard gas supplies to the Oxford district.

The demolition of the gas producing plant and most of the buildings at the old works on the North Bank of the Thames at Oxford was started during March. Necessary repairs to the various plants at the South Bank works and at Aylesbury and Banbury Groups were carried out during the year.

Work on the carburetted water gas plant extension in the Central Division at Reading was completed. While in the Aldershot Group the new 2.5 mill. cu.ft. per day carburetted water gas plant was brought into use in July.

In the Eastern Division the construction of the tray purifiers at Hilsea Works, Portsmouth, was virtually completed by March 31, 1956. Work on the foundations for the Onia-Gegi plant started in January, and the erection of the heavy oil storage tank was well advanced.

The third carburetted water gas plant at Southampton (capacity 2.5 mill. cu.ft.) was finished and gasmaking started in May, 1955. The heavy oil equipment for this plant was completed in August and by the end of the year 230,000 gallons of medium fuel oil had been gasified.

Progress on the construction of the Central works on the Isle of Wight was accelerated considerably during the second half of the year. The whole of the civil engineering work for essential gas production plants was finished and by the end of the year the construction of the carbonising plant was nearing completion and the final installation of electrical, steam and water services in progress.

In the Western Division progress was made at Bournemouth in the demolition of the retort houses at the old Poole works, ready for the use of the site as a coal yard extension. Savings in manual labour and economies in the amount of coke used in the producers were obtained by installing mechanical producer grates.

All possible sources of germanium-bearing flue dust were investigated and, over the year, 29 tons with germanium content varying from 0.25% to 2.47% were sold to the refiners. Collection of technical data in an effort to discover the optimum conditions under which germanium is deposited is being continued.

A contract for the use of refinery gas from Fawley was recently signed most of the technical and commercial problems connected with its use having been solved by the Board and the Esso Company.

NORTHERN

Trading Surplus Wiped Out by Charges

THE Northern Gas Board's accounts show a net deficit of £343,908, although there is a trading surplus of £298,921, equal to .44d. per therm of gas sold.

Income from the sale of gas amounted to £9,379,893 and from by-products (less direct charges), to £2,678,792. The revenue accrued at March 31, 1956, in respect of unread gas was £1,248,028, an increase of £168,151 over the opening figure for the year. The amount of the increase has been brought into the accounts.

Interest and other charges transform the trading surplus into a deficit. After making adjustments relating to prior years amounting to £1,621, transferring £500,000 from the taxation reserve being provisions no longer required, and taking account of the credit balance on net revenue account at the commencement of the year (£108,908), there is a credit balance carried forward of £263,379.

The total quantity of gas sold amounted to 164,718,035 therms distributed through some 5,395 miles of mains to 709,508 consumers. The overall increase in gas sales over those of the previous year was 0.98%. The increase was due partly to greater demands from industrial consumers and, to a lesser degree, to severe weather conditions in January and February.

The Board incurred capital expenditure during the year amounting to £2,543,388, of this amount approximately £1,853,962 (72.9%) was in respect of additional assets and £689,426 (27.1%) in replacement of existing assets.

EASTERN

Coal Deliveries Hit by Industrial Disputes

DELIVERIES of coal were seriously affected by industrial disputes in the area of the Eastern Gas Board and during the greater part of the year coal stocks were below safety level.

The Board had a net surplus of £8,245 during the year under review after providing £1,163,806 for depreciation, £1,033,035 for interest, and transferring £50,000 to the General Reserve Fund.

In the interests of national economy, the Board's capital development programme is to continue, at a reduced tempo. The sum of £2,048,536 was authorised by the Board to be spent on the extension and renewal of manufacturing works, plant and mains, in accordance with the capital development programme approved by the Minister in April.

During the year the Board installed gas-making plant capable of producing nearly 8.5 mill. cu.ft. of gas a day and shut down gasmaking plant of a capacity of nearly 2 mill. cu.ft. of gas a day. Six gasworks were closed during the year and bulk supplies are being afforded from other works. The number of manufacturing stations at the end of the year is 70, compared with 92 at vesting date.

Plant for the complete gasification of low grade coal is now nearly completed at Watford, while catalytic oil gasification plant is being erected at Ponders End (Middlesex), and four other oil gasification plants are on order.

The demand for gas was successfully met during the cold spell in February this year.

To conserve coal, more water gas was made from coke and oil, the consequent deficiency in coke available for sale being made good by drawing supplies from other Boards' areas.

New towns in the area progressed at a slower rate than in 1954-55, but gas sales to these towns increased by nearly one mill. therms A total of 238 miles of gas mains were laid and seven miles of distribution mains re-laid during the year.

Essex and Suffolk grids were linked in the Ipswich Division, and the first section of the Cambridge Division integration scheme was brought into operation; work started on the southern section. Extensions to grid systems were also carried out in Tottenham, Watford, and Norwich Divisions. During the year 21,492 services were laid and 9,431 services re-laid.

The upward trend of sales to industrial consumers continued, and the price of gas was reduced in five districts.

Reduced sales of appliances on hire purchase terms were recorded due to

credit restrictions—104,730 domestic appliances sold during the year.

The Board is co-operating with local welfare organisations in efforts to prevent accidents in the home, and special attention is being given in known cases of elderly people living alone.

Taking the over-all picture, trading results show a setback in contrast to the steady progress of previous years. Sales of gas to the public were virtually unchanged, while coke sales were up by 6%. Appliance sales were down by 25% (major appliances, including cookers, by 31%).

The delivered cost of coal is very high, owing to the distance of the Board's works from coalfields. The Board hopes to reduce the cost of gas manufacture by use of oil gasification plants.

WALES

Increased Gas Output

GAS output in the Wales Gas Board area during the year under review increased from 90.41 mill. therms to 93.23 mill. therms and the yield of coal gas per ton of coal carbonised decreased from 72.39 to 72.22 therms. Coke available for sale fell from 8.97 to 8.87 cwt. per ton of coal carbonised. The figures at the end of the first year of nationalisation were 67.1 therms and 7.35 cwt. respectively.

Coal carbonised amounted to 316,761 tons; 64,896 tons less than in the previous year and 147,000 tons less than was carbonised in the first year of nationalisation.

Coke oven gas purchased amounted to 66,971,810 (59,474,427) therms; an increase of 12.6%.

Gas manufacture ceased at Tredegar, Kidwelly, Pontardulais, Gowerton, Llanelly, Holywell and Flint, Beaumaris, Prestatyn, Penmaenmawr, Caernarvon, Bangor, Llandudno and Colwyn Bay when these undertakings received bulk supplies of gas from the grid systems.

The purification capacity of the Aberavon works was increased by 10 mill. cu.ft. per day. Additional purification plant of 5 mill. cu.ft. per day capacity is under construction there. Three additional compressors each of 6 mill. cu.ft. per day capacity were brought into commission in December, 1955. Two further compressors each having a daily capacity of 9 mill. cu.ft. will come into commission in July, 1956. A liquid purification plant (capacity 6 mill. cu.ft. per day) was brought into commission at Cardiff. Construction of purification and compression plant was completed at Shotton and Point of Ayr.

Apart from the supply of methane from Point of Ayr Colliery which began just after the end of the financial year, discussions with the N.C.B. for the supply of methane from further collieries in North and South Wales are in an advanced stage.

The Western Section of the South Wales Grid was extended from Morriston to Llanelly. 73.3 miles of grid main were laid in North Wales beginning at Connah's Quay in March and ending at Caernarvon in October, 1955. Using modern pipe lining techniques an average of 3.5 miles of main was laid per week.

Gas sold increased from 80.3 to 82.8 mill. therms. This represents an increase of 3.2%. Domestic commercial and industrial users purchased 42.6, 15.0 and 22.2 mill. therms respectively. The largest percentage increase was in industrial sales—6%; commercial sales increased by 5.3%; domestic sales increased by 1.7%. The total number of consumers increased from 458,386 to 465,271. Due to increases in purchase tax and hire purchase restrictions the revenue from the sale of appliances fell from £1,230,146 to £960,602.

Increased costs of transport and general materials, higher labour costs and higher interest charges necessitated an increase in the price of gas of a 1½d. per therm from 1 July, 1955. But despite an increase of 18% in the cost of coal in July, 1955, which added approximately £264,000 to the Board's expenditure in a full year, the Board did not further increase the price of gas.

Gross revenue £9,073,541 exceeded expenditure £8,835,051. This latter included interest payments amounting to £582,180 and depreciation charges amounting to £641,297. The excess of total revenue over total expenditure amounted to £238,490. From this figure £75,000 was set aside for replacement and obsolescence reserve and £50,000 to reserve fund. There remains at the end of the year an addition to carry forward of £113,490.

WEST MIDLANDS

Capacity Up by 35% Since Vesting Date

NEW plant completed during the year by the West Midlands Gas Board increased the daily gasmaking capacity in the Area by 12,880,000 cu.ft. after allowing for plant closed down and scrapped. This brought the total increase, since vesting date, to 89,890,000 cu.ft. or 35.8% of the capacity installed at May 1, 1949.

After providing for all outgoings chargeable to revenue, during the year the Board had a net surplus of £171,355, which represented only one-half of 1% of total income, equivalent to a penny in every pound received. The average price of gas sold rose by 1.3d. from 14.89d. to 16.19d. per therm due to the increased tariffs introduced in June and August, 1955.

Gas sales increased by 2% over the previous year. Sales to industry accounted for 50.6% of the total. A new weekly record output was set up in February, 1956. The total value of appliances sold declined by 17.9% below the previous year's record due to hire-purchase restrictions and increases in purchase tax.

Sales of coke increased by 0.4% to 1,245,100 tons. The yield of gas per ton of coal rose to 81.8 therms, an increase of 2.1 therms per ton over the previous year, *which represents a consequent reduction in coal usage of 90,000 tons and a gross saving of approximately £450,000.*

Economies in power and steam raising on works saved some £120,000.

The length of mains laid during the year amounted to a record total of 244.5 miles, but in view of the Government restriction the Board has had to reduce its estimates of capital expenditure, for the period 1955-56 to 1959-60, by £3,294,000, nearly 12%.

A 3 mill. cu.ft. per day carburetted water gas plant was completed at Stoke-on-Trent in 11 months. It was decided to replace an obsolescent continuous vertical retort installation at Bilston with a catalytic oil gas plant of a capacity of 3 mill. cu.ft. per day. The first of three 5½ mill. cu.ft. per day carburetted water gas plants was commissioned at Nechells works, Birmingham, while preliminary work commenced for the erection of two 3 mill. cu.ft. per day catalytic oil gas plants at Coventry.

The laying of mains to interconnect the undertakings at Wolverhampton, Bilston, Tipton, Dudley, Cradley Heath and Halesowen was completed and also from the new works at Walsall to Lichfield and Brownhills. A main from Coventry to Atherstone was completed. The works at Halesowen, Lichfield and Atherstone were closed as manufacturing stations. A bulk supply was given to Upton-on-Severn by a connection to Malvern and the works at Upton closed down. Progress in linking of the undertakings in south-east Shropshire with the Wellington works was continued and supplies of gas at Newport, where demand is increasingly rapidly, can now be augmented by a supply from Wellington.

The Board was compelled to make two revisions of gas tariffs, in June and August, 1955, due to additional costs, principally coal, which had to be met since the last revision of tariffs two years earlier. Because of increased efficiency and economies the Board was able to bear a substantial amount of the additional costs internally.

NEW PRIVATE COMPANY FOR BRITISH OXYGEN

British Oxygen announce that a new private company, British Oxygen Research and Development, Ltd., has been registered and will come into existence on October 1. This new company has been formed because research and development is regarded by the parent Board as a separate activity equal in status and importance to the operating companies in the group. It takes over British Oxygen's research and development centre at Morden, Surrey, which has been in operation for over 10 years.

The Essex Bulk Supply System Shows that

INTEGRATION CAN TACKLE HIGH DEMAND

says

E. S. DENNIS, A.M.Inst.Gas E., Colchester, in his Presidential Address to the Eastern Junior Gas Association, of which the following is an abstract

WHILE the promotion of the wide use of oil in our electrical power stations and the development of nuclear energy will make available a large quantity of coal to be more economically consumed elsewhere, it is not considered that they will materially increase their own thermal efficiency, or effect a reduction in the cost of electrical current to the consumer. Therefore, the gas industry may well benefit by being able to gasify lower grade coals and promote the wider use of the complete gasification process.

The modern gasmaking plant has a thermal efficiency of 84-86% and is so streamlined that a further reduction in labour seems unlikely and only by increasing its size can one hope to effect a saving. However, to maintain this efficiency and perhaps promote it still further we can by our own endeavours pay careful attention to every detail to ensure that no waste occurs.

In 1939 the manufacturing plant at Colchester comprised a horizontal retort house with a maximum productive capacity of 1¼ mill. cu.ft. and a semi-automatic water gas plant to make 900,000 cu.ft. per day. In addition there was a small hand operated C.W.G. set, the working costs of which were uneconomic.

The horizontal retort house was erected in 1919, with six beds of eight retorts and extended in 1925 with a further three beds. Coke from the retorts was discharged into steel trucks, quenched and emptied into low level reinforced concrete storage bunkers of 24 hours capacity, whence it was dropped into skips and lifted by a gantry crane into the coke screening plant.

Phenomenal Increases

By 1944 in common with other gas undertakings, Colchester was experiencing phenomenal increases in gas output. The supply to prepayment consumers compared with 1938 had increased by 36% and to ordinary consumers by 31%. The supply to the War Department (Colchester is a garrison town) had quadrupled, but this formed only just over 4% of the total output. To meet these increases the water gas plant had to be used as a base load plant. Under these conditions it was necessary to give serious consideration to the extension of the carbonising plant. In the last complete year before the war (1938) the total gas made was 369 mill. cu.ft. In 1944 the output had increased to 504 mill. cu.ft. The maximum daily quantity made in any one day during that year was 2.062 mill. cu.ft.

The increase in demand that had been experienced was, of course, due either directly or indirectly to the conditions created by the war. Directly in the case of the War Department, and indirectly by higher employment, higher wages, desire for better living conditions and the shortage of solid fuel. It was natural to assume that at the end of hostilities the War Department's gas consumption would decrease and that there would be a decrease in the industrial load. But the additional gas burning equipment installed by the War Department and the Government policy of full employment made this by no means certain.

It was reasonable to believe that the indirect causes of higher demand would continue independently of war-time conditions. The experience after the 1914-18 war had shown that the consumption went on increasing until 1921 when it dropped slightly but fully recovered by 1923 despite a general fall in the level of wages. Further, it was necessary to keep in mind the trend of extending the manufacture by larger and more efficient works so as to supply adjacent undertakings that were already proving to be too small for economical operation. In this respect Colchester was favourably situated to extend within a radius of 10 miles the supply of gas in bulk to small privately owned gasworks which bounded their Parliamentary area of supply. It was considered that Colchester should make provision to meet a demand of not less than 500 mill. cu.ft. per annum and that extensions should be made in such a way that further plant could be conveniently installed when found necessary. In practice to sell 500 mill. cu.ft. of gas per annum it is, of course, necessary to manufacture some 535 mill. cu.ft. The proportion which the greatest output on any one day bears to the yearly demand depends very largely on the month in which the coldest weather is experienced. An examination of this proportion over the period of the previous ten years showed that it had varied between 1/233rd. and 1/273rd. of the annual output.

Taking the most unfavourable figure it proved that to meet a yearly output of 535 mill. cu.ft. a manufacturing capacity would be required of approximately 2¼ mill. cu.ft. per day. There were several different ways in which the carbonising capacity could be increased, but only two alternatives which merited serious consideration; either to extend the existing horizontal plant or to replace it by an installation of continuous vertical retorts.

If the horizontal house was extended it would have been necessary to add a further six beds, the daily capacity would have been increased to a total of approximately 2 mill. cu.ft. and, adding the proportion of water gas made before the war, would have brought the maximum capacity up to about 2¼ mill. cu.ft. or a working capacity of 2¼ mill. At a minimum expenditure this would have cost £60,000. In addition to extending the carbonising plant the increased quantity of coal and coke to be handled would put a heavy burden upon the existing arrangements and in all probability would have necessitated considerable modification or extension. Further, a sum must have been provided thoroughly to overhaul the ironwork of the existing nine beds, as wear was being accentuated by the black-out conditions. In order to revert to pre-war practice of adding water gas to control the calorific value of the gas, the hand operated water gas plant would have had to be replaced at an estimated cost of £10,000 to £12,000.

Cost of a C.V.R.

The estimated cost of installing a continuous vertical retort plant with a capacity of 2¼ mill. cu.ft. was considered to be about £125,000 to £130,000, but against this extra cost the whole plant would be new, whereas the existing plant having been in use for 25 years would probably only have a further

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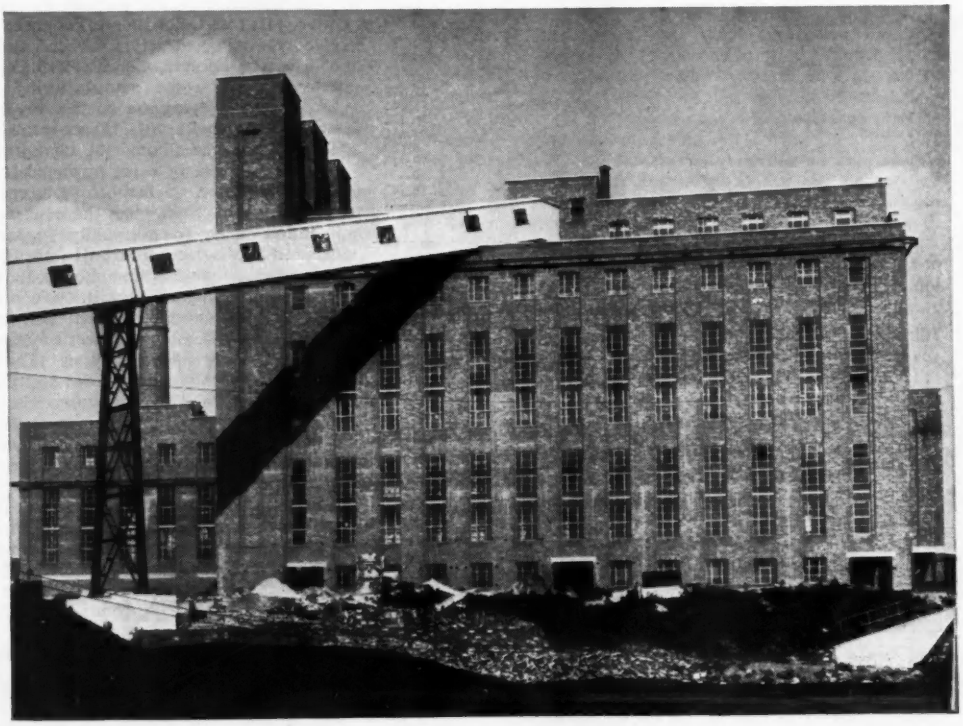

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life of 10 to 15 years before it would be necessary completely to replace it.

The merits of the two alternatives were examined in considerable detail. In the year 1944, the cost of manufacture was £66,029 and a comparative cost was then determined assuming a vertical installation had been in operation. These comparative costs are summarised in Tables I and II.

TABLE I.
Net Cost of Manufacture in 1944

	£	£	£
Coal, oil and coke less residuals			80,660
Coke, less charges		27,249	
Coke used for water gas		8,191	
		35,440	
Tar, less charges	4,268		
Benzole, less charges	4,493	8,761	
Sulphate, less charges		72	
			44,273
			36,387
Purifying			310
Salaries			1,451
Wages			8,861
Repairs, etc., of works and plant			19,020
			£66,029

TABLE II.
Estimate of Net Cost of Manufacture with Vertical Plant

	£	£
Coal, less residuals		79,123
Coke, less charges	36,041	
Tar, less charges	6,214	
Benzole, less charges	5,352	
Sulphate	72	
		47,679
		31,444
Purifying as 1944		310
Salaries		1,451
Wages		6,122
Repairs, etc., of works and plant as 1944		19,020
		£58,347

This is not a true comparison as the proportion of carburetted water gas of a much higher calorific value had to be made during this particular period, due partly to Government direction and partly because of the inadequate capacity of the carbonising plant; thus the high price of coke and oil increased the actual manufacturing costs. A calculation was made to ascertain what the cost would have been in 1944, had it been possible to make enough coal gas and limit the quantity and quality of the carburetted water gas in accordance with pre-war practice. This estimate is set out in Table III, and shows that under these conditions the cost of manufacture would have been £63,174.

TABLE III.
Estimate of Net Cost of Manufacture in 1944 *if the percentage of Water Gas and quality had been the same as in* 1938.

	£	£
Coal, oil and coke, less residuals		86,164
Coke, including C.W.G. coke, less charges	42,427	
Tar, less charges	5,009	
Benzole, less charges	5,538	
Sulphate, less charges	72	
		53,046
		33,118
Purifying as 1944		310
Salaries		1,451
Wages		9,275
Repairs, etc., of works and plant as 1944		19,020
		£63,174

The comparative costs are, of course, on the assumption that the coke sold from the vertical plant would contain a similar moisture content as that in the coke sold in 1944. If this assumption is accepted the net annual saving to be expected by installing a vertical plant would be £4,727. Tenders for a continuous vertical retort installation (complete with coal and coke handling plant and waste heat boilers) were invited to be submitted in 1945. After due consideration had been given to these tenders the Woodall-Duckham Vertical Retort Company were instructed to carry out the work and site operations commenced in 1946.

The carbonising plant was to have a gross capacity of 2½ mill. cu.ft. of 470 B.Th.U. gas a day, after the extraction of 3 gal. of benzole per ton of coal carbonised and provision made for the plant to be capable of extension to give a daily gross output of 3 mill. cu.ft. of gas.

The retort bench to contain 20 82-in. major axis continuous vertical retorts, with lambent heating. Transverse air cooled division walls were to divide the bench into five beds each containing four retorts. Four step grate producers were to be provided in one battery to heat the setting on run of retort coke. By 1947, pressure was being brought to bear by the Ministry of Fuel and Power for Brightlingsea and Wivenhoe to be supplied with gas in bulk from Colchester.

Capacity Outstripped

The Wivenhoe undertaking had an output of 10 mill. cu.ft. a year and the growth of shipbuilding in this riverside village was rapidly out-stripping the capacity of the local gasworks and necessitated an expenditure of £6,000 to cover the cost of extending the plant. In 1948, permission was granted to lay a main from Colchester to Wivenhoe of sufficient capacity for it to be later extended to Brightlingsea and a second contract was entered into, with the Woodall-Duckham Vertical Retort Company, to provide the additional half mill. capacity in the new house, in anticipation of further developments. The first portion of the new plant went to work in late 1948, and by November, 1950, the extended plant was working to its full capacity of over 3 mill. cu.ft. a day.

At vesting date, the Ipswich Division had the new vertical retort plant at Colchester at work and another at Chelmsford in course of construction. Faced with an immediate shortage of gas at Braintree, the Essex Bulk Supply Scheme was developed to link the manufacturing station at Colchester to Braintree, supplying gas on the way to Kelvedon and Witham and several small villages not previously supplied with gas. This scheme necessitated the laying of approximately 22 miles of main, such main being arranged for extension to the manufacturing station at Chelmsford to enable this works to supply into the new system when the new plant became available, the intention being to eventually supply the whole of the gas demand in the area covered by the grid main from these two works which would be built up to have a combined manufacturing capacity of 10 mill. cu.ft. a day.

Work commenced in March, 1950, on the first section of the trunk main and after a concerted effort was completed by the Autumn of the following year. The works at Kelvedon and Witham were then closed down and the gas supply at Braintree was supplemented from Colchester. At the end of 1952 the second portion of the main was laid and Chelmsford was enabled to feed into the system and the main was further extended to Maldon and Heybridge and the Maldon works closed down.

Step by step the output from the two main manufacturing stations was increased and the advantages of the link were beginning to be reflected in the manufacturing results of each station. At March 31, 1953, Chelmsford had experienced the benefit of a full year's working with its new plant and had increased its output by contributing to the grid.

Retort Repairs

So that the two manufacturing stations should not coincide with their retort resetting it was programmed that Colchester should commence during the summer of 1953 to repair four retorts. During 1954 and 1955 the remaining sixteen retorts of the original contract were re-set. It will be appreciated that any such programme can adversely affect the efficiency of a station, although at Colchester, the efficiency reached 88% in the first year in which the repairs commenced. This is attributed to the fact that during the period, Colchester produced approximately 10% more gas than during the preceding summer. In the subsequent years a decrease in the efficiency occurred, but the results on the manufacturing station at Chelmsford improved by being able to maintain a higher load factor.

The price and quality of the coal we all have to carbonise is beyond the control of the works engineer. Colchester is entirely served by seaborne coal and, assuming the same quality of coal and make per ton, the price during the past five years has risen by an amount equivalent to 2.51d. per therm of gas made.

Although the wages rates have advanced by 35.66% over the

same five years, the larger make of gas per man due to the greater demands on the plant for the bulk supply of gas have limited the amount of the increase to an equivalent of .14d. per therm. By reason of the higher prices obtained for coke, tar, etc., and economies in working the net increased cost of gas into holder has only increased over the same period by 1.43d. per therm.

The higher load factor at the Chelmsford works occasioned by the retort repairs at Colchester enabled this works to reduce its process wages cost by .16 pence per therm and the total cost of gas into holder by .33 pence per therm between 1951 and 1956, and this was achieved despite the fact that coal prices had risen by the equivalent of 3.16 pence per therm. It is not possible to ascertain, with any degree of accuracy, what the present cost of the amount of gas taken from the grid would be if it was produced on the works which have now ceased manufacture, but to give you an idea of how these small units have been affected by the increases in wages rates, the process wages today on a works making 40 mill. cu.ft. of gas per annum has risen by 4.13d. per therm.

Substantial Saving

A cursory examination of these facts is sufficient to cause one to appreciate that process wages on a modern coal carbonising plant, working on a high load factor, no longer represent the high proportion of cost previously experienced. In this respect the policy of integration has substantially effected a saving.

There are other factors which readily spring to mind which go to enhance the value of the policy. For instance, it has enabled the cost of gas to be kept at a more reasonable price in small districts and has probably prevented the loss of consumers who, for reasons of personal economy, might have been forced to use alternative fuels less economical to the nation.

As the industry has progressed so the yard stick by which the gas engineer measures his lot has changed. In the first instance he was judged by the quantity of gas he could produce from a ton of coal. The introduction of standardisation of gas quality throughout the industry by Act of Parliament, made the gaseous therms his pride and joy. Today, the importance of coke as a smokeless fuel has encouraged the gas engineer to devote as much attention to its production as is given to the gaseous thermal yield. A balance between the thermal yield and the quantity of coke produced must now be his measure of efficiency.

It is not always readily appreciated that an increased yield of .1 cwt. of coke per ton of coal carbonised, if made available for sale, is equivalent in value to the revenue received from .5 therms of gas. As the demand for coke as a domestic fuel is out-stripping its production, the benefit to be accrued by generating steam from waste heat and the utilisation of exhaust steam on a works is of the utmost importance.

Generally speaking the amount of unskilled yard labour on a gasworks is largely dependent upon the existing type of dry purification plant, although this generalisation is to some extent varied by the amount of mechanisation practised on each separate works. The design and operation of dry purification units has not materially changed for over half a century, although considerable research has been carried out in this field. We trust the chemists will surmount present difficulties and give us a plant to operate which we know will meet the rigid requirements of the Gas Act, can be installed without involving the Board in too much capital expenditure, and can be worked with a smaller labour force. At one time casual labour was obtainable, but now men must be employed who can be available when required, for emptying and re-filling purifier boxes. If a continuous system for the removal of hydrogen sulphide could be evolved a reduction in the labour force would be possible, and this seems to me a direction in which valuable research could be further pursued.

Best Use of Labour

In the meantime, the engineer is faced with the problem of making the best use of a labour force which is required really for, perhaps, only one-third of its working time on purification.

The use of modern equipment in our maintenance shops should also engage our attention. The actual repair and maintenance of plant is today a costly item. Full advantage should be taken of up-to-date machine tool equipment. Although I appreciate it is not always easy to substantiate the cost of a particular tool, by careful budgeting a works can accumulate a very useful and efficient repair shop suitably and adequately manned to perform most duties associated with the day to day maintenance of the plant and be capable of performing major overhauls, without the necessity of calling in plant specialists to do the work.

Exact Control

Nationalisation has enabled the station engineers to work together in closer co-operation than has previously been possible, and I can foresee the day when we shall have our own teams of maintenance personnel trained in a particular function, that can be readily moved from station to station to expedite major repairs. While integration of our manufacturing station has permitted the engineer to direct the plant under his control to be more efficiently operated, the importance of using the available gas storage to the maximum advantage in order to maintain a steady load, necessitates exacting control to be given to the daily requirement of the grid.

The gas supply to the holder stations is controlled by volumetric governors and automatic cut-offs. Every effort is made to get these governors to provide a steady input into the holder, but not infrequently in the early hours of the morning the valves automatically close, reducing the output into the grid from the main station. If the manufacturing station is having to work to close limits in order to maintain its low pressure supply to its own district this may cause some embarrassment to accommodate this additional volume of gas. This perhaps will be more readily appreciated if I mention that the total storage capacity of the holders in the grid is 4.14 mill. cu.ft. and the maximum gas dispensed in any one day so far is approximately 8 mill. cu.ft.

The instrumentation and control of the Essex Bulk Supply Scheme is gradually being developed as the scheme proceeds to grow. In the first instance only the essential instruments have been installed for controlling the supply of gas to the various districts. The Board has not been committed to a large expenditure in this direction purely for the purpose of producing a scientifically equipped control centre, where such control can be performed at considerably less cost. At present the control is relatively simple. Each station reports the morning and evening stock position daily. The morning figures are used to determine the gas requirements for the current 24 hours and to arrange for the allocation of the stock over the various gasholders throughout the grid. The evening stock position serves as a useful guide and check against the original estimates and permits such variations in the original instruction to the district to be given in sufficient time for the gasholder attendants to take action before finishing work for the day. The estimates of the day's requirements are based on experience of the load on the corresponding day of the previous week, due consideration being given for adjusting the production to meet changes in climatic conditions.

Degree Day System

The degree day system is extensively practised in the United States for determining the load but in this country, up to the present, little has been done to make general use of it. We are collecting information to pursue the possibility of applying this system to our calculation, but so far we are hesitant to suggest that it can be applied with a sufficient degree of accuracy to be of any material advantage.

I believe that automatic remote control of valves and information such as flow of gas at different points within the grid and gasholder heights at holder stations could be transmitted to the controlling station with some gain to the system. My experience, however, of such a system is that it is not entirely reliable, quite frequently the control centre has to revert to using the telephone for its information.

Doubtless science will eventually provide these instruments to be 100% dependable, but I hazard a guess that the cost may well be prohibitive. The use of short-wave ratio would be a valuable asset and its initial cost might well be saved by the reduction of telephone charges. It would have a wide and varied application in integration and could provide a valuable link when repairs to the trunk mains have to be carried out in isolated country.

ELECTRO DETARRING

Manchester and District Junior Gas Association, September 22.

—Abstracts from a paper by H. G. Cooper, F.R.I.C., M.Inst.Gas E., A.M.C.T., Gas Division. Chemical Plant Department, Simon Carves Ltd.

IN the very early stages of the purification of town gas one of the first impurities requiring removal is tar fog. This tar fog is generally accompanied by water mist and in some instances by traces of fine carbon or dust.

Before the development of the Livesey washer more than 75 years ago, tar fog removal must have presented a most acute problem, and even after this, many attempts were made to improve tar fog removal, as the deposition of tar during the ammonia washing stages, in the gas mains, and in the oxide of iron mass of the purifiers was both messy and led to general inefficiency. Ammonia washers are choked which causes the surface area to become less effective for the absorption process, and the oxide in the purifiers becomes coated with tar and is thus inhibited from the reaction with hydrogen sulphide and the subsequent oxidation.

On many coke oven plants, where the direct method of ammonia recovery is practised and the crude gas passes through the saturator containing free sulphuric acid and sulphate of ammonia, any tarry matter present in the gas, can seriously affect the quality of the salt produced and lead to frequent cleaning out of the reaction vessel. The various methods for the elimination of tar fog which have been developed in the past consist of centrifugal separation, various forms of filtration, or impingement. Such devices are: Cyclones, turbo extractors, tar fog filters, P. & A. tar extractors, and as mentioned earlier, the Livesey washer.

Under normal operating conditions such devices have operated at efficiencies of the order of 80-90% or less, that is, the slip of tar fog has been of the order of 10-30 grains or more per 100 cu.ft. of gas. Higher efficiencies have been obtained but only at the expense of a greatly increased pressure drop and greater power costs. It was not, however, until the removal of tar fog by electrostatic precipitation was developed that the really satisfactory removal of it from gas was achieved.

This offers a very satisfactory solution to the problem of tar fog removal at extremely high efficiencies with particularly low back pressure and at very low power consumption. The importance of the reduced cost of tar fog removal compared with the older processes may also be shown by the reduced back pressure at the purifiers caused by the lower content of tar accumulating within the mass. And, on coke oven plants where crude gas is used for the firing of the ovens, the easier maintenance for the satisfactory working of the burners.

Although the efficiency of a detarrer is reduced by heavy overload of gas throughput, etc., electro detarrer plants, generally speaking, can take a considerable overload depending on the margin of design, and yet maintain a relatively high degree of tar fog removal. The maintenance of these plants needs very little attention, and the modern electrical equipments are extremely simple in operation.

Principles of Electrostatic Precipitation

Electro-precipitation is fundamentally a simple process, in which the basic principle is the removal of solid or liquid particles from a gaseous carrying medium by giving the particles an electrical charge and precipitating them on to a receiving surface in an electrical field. Fig. 1 shows an electro-precipitator which consists of a receiving electrode (the cylindrical tube) in which is coaxially suspended a discharge electrode (a thin round wire or a fluted rod) to which is applied a high tension unidirectional current from a suitable source.

The electro-precipitator operates by causing electrically charged particles to be transported in an electric field. Although the particles in a gas stream often carry an original and natural charge, this charge is so small that it can be ignored for practical purposes. The first step in precipitation is therefore to impart an electrical charge to the particles to be collected, by the formation of free ions. Although radioactive elements might be introduced or other means of ionisation might be used, ions are generated in very large quantities when a corona discharge is set up in an electric field of high intensity. This, then, is the method generally used.

When a wire of small cross-section is charged to a high

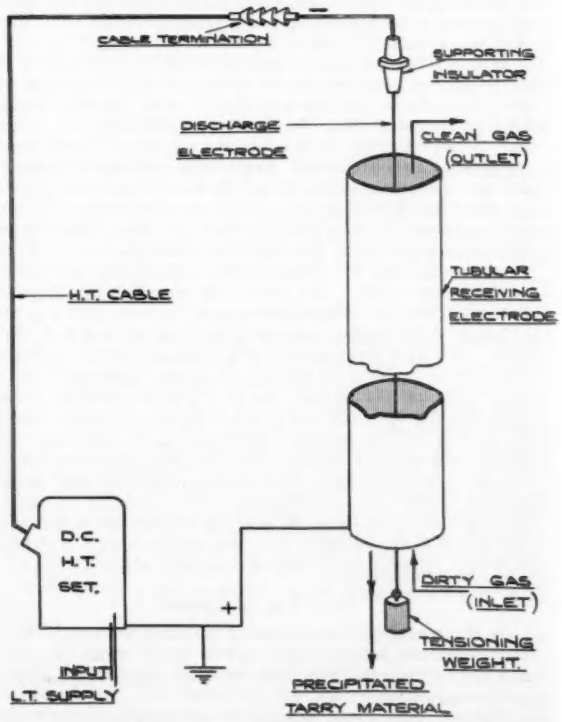

Fig. 1

potential an intense electric field is created in its immediate vicinity. An electron in this field is so greatly accelerated that on striking a molecule it can set free another electron; both electrons are again accelerated, striking other molecules and setting free more electrons, so that an eruption of ions is brought about. At a certain distance from the charged wire the field strength diminishes to a point at which electrons are no longer sufficiently accelerated to release further electrons by shock ionisation: At this distance the discharge belt ends.

The discharge belt is visible as a bluish glow around the discharge electrode wire and, if closely observed, the belt can be seen to consist of numbers of separate flow points of somewhat unstable intensity; transportation of ions takes place in the dark space beyond the belt. This phenomenon is known as the corona discharge. To maintain the discharge, fresh electrons must be produced at the wire and although photo-electric effects may be involved, the main source appears to be electron emission from the wire.

Discharge electrodes are normally at negative potential, since the negative corona discharge is more stable than the positive and the applied voltage can be maintained at a higher value. In this way a state of equilibrium is set up, in which the corona constantly supplies ions of the same sign as the central electrode to the much greater space outside the corona and it is in this space that the removal of particles must be studied. Some of the ions attach themselves by collision to the particles and the charged particles then drift to the earthed pipe wall under the influence of the electric field as well as along the tube with the gas. Efficiency requires that most of the particles should reach the wall before leaving the chamber. The gas velocity is usually in the order of two to 10 ft. per second and the diameter of the tube six to 11 in. Turbulence of the gas tends to re-distribute the particles with the result that it is found necessary for reasonable efficiency to have an electrical zone nine to 12 ft. long.

Tar Fog Testing

Modern detarring plants are usually designed for very high efficiencies of tar fog removal from fuel gases, and the term 'tar fog testing' often implies the estimation of little more than traces of this impurity in the gas. The concentrations are generally of the order of two to three grains, and sometimes considerably less, of tar fog per 100 cu.ft. of gas. The number of practical difficulties and pit-falls, therefore, which can arise when estimating such small quantities of tar in the presence of so many other impurities are obvious, but the three essential methods for the removal and estimation of the traces of tar in the gas are filtration, impingement, and electrostatic precipitation.

Filtration is effected by filter paper, or some other suitable filtering medium, and the resulting filter residue is then estimated by an increase in weight (Pexton Test) or colorimetrically (Bambrough Test).

Impingement tests are carried out by discharging the gas through a suitable jet offering 22 in. W.G. or greater back pressure when the fog and mist present are 'knocked out,' and collected in a suitable receiver, and finally weighed.

Electrostatic precipitation of the gas implies the use of a model type instrument to thoroughly clean the gas of mist and tar. The precipitate is collected and then weighed (Gasstichting of Holland).

These, broadly, are the principal methods of estimation, but now let us consider the pit-falls.

If coal gas is being tested ammonium salts can seriously interfere with the test as these are dissolved in the aqueous mist which is also collected, and with horizontal and coke oven gases, naphthalene might often be 'chilled out.' On drying-off the moisture certain ammonium salts undergo oxidation and if estimation is made by simple weight increase, large errors result. When the tars too are themselves dried, certain constituents undergo oxidation which cause errors in the calculations.

The actual conditions of drying are therefore most important, and may cause tar to be vaporised.

An alternative procedure of estimating the precipitated tar colorimetrically is generally carried out by extracting the tar from the filter medium, filtering the solution and comparing this against newly prepared standards made from seal pot precipitated tar. This procedure is open to the criticism that 'free carbon' is not included in the estimation and also that the coloration properties of the seal pot tar and the filtered, that is, the outlet tar fog, may not be essentially the same. Generally, however, the 'free carbon' content is particularly low and the error would, therefore, be negligible.

These comments apply particularly to the methods classified under 'filtration." In the other two methods impingement and precipitation, however, the broad assumption is made that the ratio of tar to liquor precipitated in the full scale plant is the same as that obtained in the small testing apparatus, and that water mist and tar fog are precipitated at essentially the same rates.

After due consideration of the facts, Messrs. Simon Carves have decided that the colorimetric method would give the truest values, and from experience most consistent results are obtained, though previously the Pexton Test had always been employed.

The detailed procedure of the colorimetric test has been developed by the Simon-Carves' Gas Division staff and research staff from that outlined by Bambrough.

Impingement methods depend upon the discharge of the crude gas through an orifice or fine nozzle (usually a glass tube drawn out to a fine capillary discharge point) and the collection of the tar and water in a suitable receiver which can be accurately weighed on a balance. Generally no attempt is made to dry off the water deposited but rather to measure the overall efficiency on the tar plus water basis.

Certain adaptations of this method can suffer from the difference in temperatures between the gas and the instrument, or the length of tubing used to convey the gas sample to the instrument. In this same length of tubing, tar and water mist may be precipitated and, therefore, may never be included in the test result.

Following are the results of tests carried out to compare the impingement method and the coloration test described earlier. The gas being treated was vertical retort coal gas.

Test No.	Inlet tar fog	Outlet tar fog		% slip	
		Coloration	Impingement	Coloration	Impingement
1	65	0.30	0.625	0.46	0.35
2	55	0.213	0.64	0.39	0.42
3	63	1.1	0.55	1.75	0.32
4	63	1.3	0.97	2.06	0.56
5	51	2.2	1.28	4.3	0.91
6	50	2.45	3.2	4.9	2.34
7	47.3	2.45	3.65	5.2	2.81

The foregoing 'fog' concentrations are measured as grains per 100 cu.ft. gas.

The water: tar ratio of the inlet gas was 1:1.75. Percentage slip: In the coloration method it is calculated on a dry tar basis, but in the impingement method, on a tar and water basis.

Electrostatic precipitation methods need little description provided the test is carried out with due care. It is possible with the extremely fine particles present, if proper care is not taken, to allow a relatively large quantity of these particles to 'slip' through the aparatus. In fact, from the tests carried out quite independently by the Gasstichting of Holland, there seems to be a tendency for their results to give higher values of percentage slip than those obtained by the colorimetric method.

The disadvantages of this method are probably more emphasised than those of the impingement method as it is more difficult to maintain the larger apparatus at precisely the same temperature as the gas, and the tar and liquor also can fall out of the gas (at lower efficiencies) in the tube conveying the gas sample to the test apparatus.

A further difficulty, particularly when testing gases containing H.T.A.'s and employing aluminium foil as the receiving electrode, is the formation of complex oxidised phenol/aluminium compounds which will be included in the tar figure.

It is clear, therefore, how important it is to establish a standard method of testing which can be universally adopted. This is particularly so because of the high efficiency of tar fog removal asked for by the client and in most instances guaranteed by the contractor.

Industrial precipitators are of three classes, wire and tube treaters, wire and plate treaters, wire and square duct treaters.

A typical illustration is a wire and tube treater and a sectional elevation is shown in Fig. 2. The wire and square

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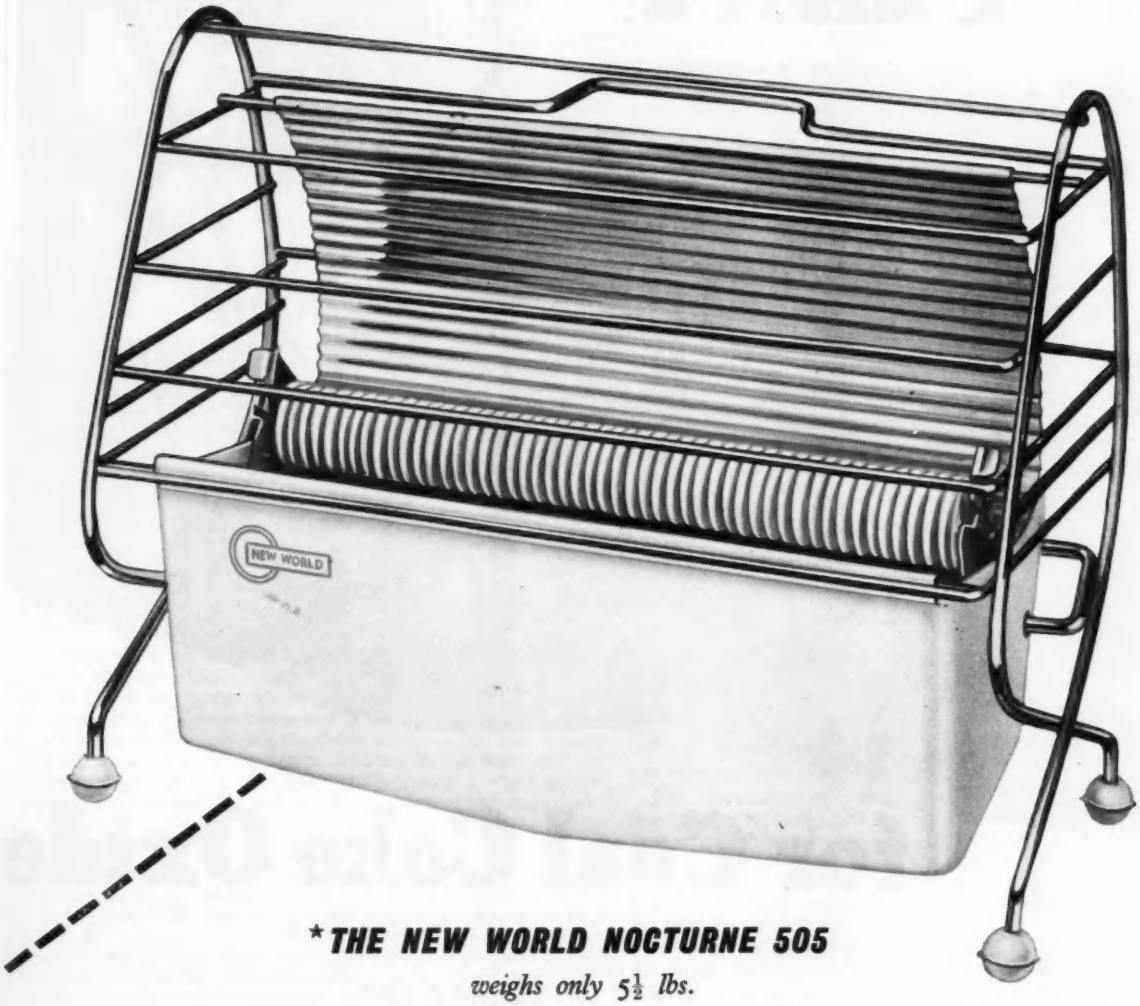

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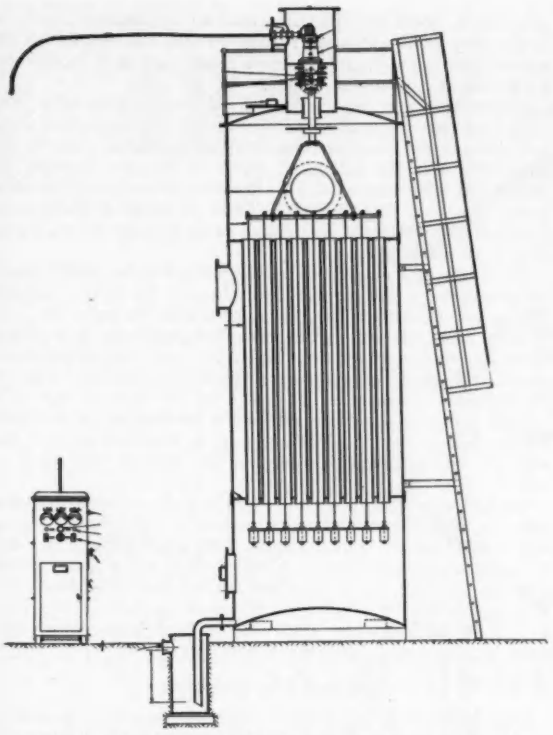

Fig. 2.—Arrangement of tube-type electro-precipitator.

duct treater is, in general, identical to the wire and plate treater, with the exception that cross fin plates are included with each alternate receiving electrode plate, which appears as a square pack formation in plan view. This design makes possible almost twice the receiving surface area than that of the plate treater.

The vessels consist essentially of five portions: The top insulator housing(s) which are cylindrical in design; the upper gas portion of the treater which includes the gas outlet and the upper access manhole; the centre portion of the vessel or electrical zone which includes the tubes, plates or the square pack plates; the lower section which includes the gas inlet and the lower access manhole, and finally the fifth portion which houses the discharge electrode system complete with supporting framework.

The insulator housing supports the porcelain high tension insulator which is rigidly clamped to a horizontal division plate. Through this porcelain insulator and firmly clamped to it, all joints being gas tight, is a mild steel tube, which conveys the H.T. current to the electrodes below. The H.T. current enters by a cable fitted with a heavy porcelain bush at the upper side of the insulator housing. The upper portion of the insulator housing is purged of air by clean gas, or may be insulated by a depth of transformer oil. In this upper housing also, there is fitted the earthing switch and complete interlocking system.

Steam Heated

The lower section of the insulator housing is steam heated, either by a steam coil or an annular chamber, in order to maintain the insulator in a dry condition, and access to this section of the insulator and heating chamber is made available through a quick release interlocked handhole.

To prevent the free circulation of gas in the lower section of the insulator housing, a system of ducting and baffle plate is included which reduces to a minimum the quantity of gas which can enter. This in turn reduces the accumulation of tar, and the need for the periodic cleaning of this portion of the treater.

The mild steel support tube which passes through the porcelain insulator is rigidly connected to an upper framework by means of four turnbuckle adjustable rods which are used to obtain minute adjustment of the electrode upper frame. The discharge electrodes hang from the upper frame and are equidistantly positioned by the lower framework.

In the tubular treaters, the electrodes are held taut by means of weights, but in the plate and square pack treaters, the lower framework is rigidly positioned by means of adjustable stay tubes and the electrodes are individually held taut between the two frames by means of a spring loaded adjustable device.

The chief advantages claimed for tubular treaters are that the dielectric distance from the discharge to the receiving electrode is equal throughout and that the tar and liquor dripping from the tubes cannot, on any occasion, exceed that quantity precipitated in the one tube. This tends to improve the condition of stability of working.

The great advantage of plate and square pack treaters is the cheapness of design since both sides of the plate are employed as receiving electrodes. Provided also, that, the detarrer is suitably designed and not overloaded with the quantity of tar and liquor being precipitated, this type of plant is found in practice to be as efficient as the tubular treater, but at much lower capital cost.

High Tension Equipment

The shockproof static high tension selenium metal rectifier equipment is an outstanding feature of the Simon-Carves precipitator design and has been proved very efficient and reliable in use. These H.T. sets are of Simon-Carves-Ferranti design. The static metal rectifier, though subject to small electrical losses, gives a very smooth output voltage and is quite suitable for high efficiency precipitation. The absence of all moving parts eliminates maintenance costs and the reliability of the equipment renders a spare set unnecessary. The basic principle of the Simon-Carves-Ferranti electrical system consists of two halfwave rectifiers each in series with a condenser of suitable capacity and each operating on opposite half cycles.

During the half cycle when one rectifier operates, the condenser in series with it becomes charged, so that during the next half cycle when the other rectifier allows the current to pass, the charge in this condenser is in series with the rectified voltage which gives an output voltage greater than the input.

The rectifiers are of the selenium iron disc type, and consist of a number of iron discs coated on one side with selenium and held together under considerable pressure. Current flows readily from iron to selenium but only with great difficulty from selenium to iron. Although heat is generated by this arrangement, it is dispersed through the radiating fins into the oil and suitable arrangements are made on the H.T. set assembly to disperse this heat into the atmosphere.

The electrical equipment forms a single self-contained unit in a steel plated tank. All live parts are totally enclosed when in use and provisions are made for conduit or cable entries according to requirements, and for the entry of the H.T. cable at the back of the set. An interlocking system between the L.T. current input and access to the L.T. connections renders the unit shockproof.

Generally, these H.T. sets are designed for indoor use, and the larger capacity sets are equipped with additional cooling tubes to dissipate the extra heat generated due to the heavy loading capacity, but recently, an outdoor H.T. equipment has been designed. This can be positioned reasonably close to the detarrer vessel. As these equipments are weatherproof, they have the advantage that no special building is needed to house them. The fact that the H.T. equipment can be quite independent of the main treater vessel ensures that it does not suffer any ill effects which might be the result of steaming out the main vessel.

In certain instances clients have requested us to include an automatic reclosing device, so that if the L.T. current is switched off because of a momentary arc-over or other reason, the circuit will be reclosed, and will obviate the necessity of the operator having to reclose the contactor manually each time the equipment has tripped out due to a temporary overload condition. The controls are adjustable and can be so arranged that after a predetermined number of succeeding 'trip-outs' the main cut-out operates and the warning Klaxon alarm will sound. A most useful arrangement if the operator is located some distance away from the H.T.

equipment as he only needs to operate the set manually when there is a sustained overload. On such occasions only will a special investigation be needed to determine the cause of this sustained overload. In certain instances it is advantageous to have available an H.T. set which will automatically give almost uniform milliamp output under varying load conditions. Such an instrument has been designed and some are now working very successfully.

What Degree of Removal?

The purpose of detarring is to maintain the succeeding operations of gas purification, of washing and H_2S removal in as tar-free a condition as possible compatible with practical considerations and although in the early days of the installation of these detarring plants an efficiency 'of 99% $\pm$0.5% tar fog removal' was spoken of by both contractors and clients it was seldom confirmed by practical tests. In later years, however, with the increasing emphasis on 'efficiency' (and tar fog extraction is no exception), it is instructive to consider what is the optimum condition of efficiency for a particular plant, such as a coal gas plant.

Crude coal gas contains in addition to the tar fog ammonia, sulphuretted hydrogen and hydrogen cyanide. These three impurities in the presence of moisture and, in direct contact with metallic iron, can give rise to a very rapid chemical reaction in which the metallic iron is first attacked by the sulphur. The sulphide so formed is very rapidly dissolved in the alkaline cyanide solution, with the formation of ammonium ferrocyanides. This reaction proceeds at an alarming rate and corrosion could be very serious, but luckily for the gas industry, traces of tar fog which are almost invariably present, cause a minute film of tar to separate the aqueous solution from the metallic iron of the vessels, and the rapid chemical attack is inhibited. But, if electrostatic detarring is carried out too effectively, chemical attack becomes far more pronounced. Occasionally, such examples are encountered.

It is our experience that generally a slip of one or even two grains of tar per 100 cu. ft. at the outlet of the detarring vessel can be a decided advantage, since this trace of tar tends to inhibit the corrosive attack and yet is at so low a concentration that the ammonia washing plant and gas purification system is unaffected.

In fact, it was found on tests carried out at a large gas undertaking about 20 years ago, that although a concentration of 10 grains of tar fog per 100 cu.ft. of gas was passing the P. and A. detarrers, the gas entering the purifiers contained only about one grain per 100 cu.ft. It seems, therefore, that only a very small proportion of the one grain per 100 cu.ft. slipping the electro-detarrer (which is the recommended condition) will reach the purifiers.

In this connection, too, work done on oxide of iron purification by Dr. Moignard shows from the records made at a works that the tar in the gas entering the purifiers was of the order of two grains or less per 100 cu.ft. with an H_2S concentration of about 650 grains per 100 cu.ft., gave rise to spent oxide containing approximately 50% sulphur and 1% tar. From the tar fog present, the tar in the oxide could not have exceeded, say, 0.3%, so that the remaining tar had clearly come from some such source as the unsaturated hydrocarbons, indene, etc. Much of the tar in spent oxide, therefore, is due to this source and not to tar fog entering the purifiers. Intensive gas cleaning by electrostatic methods, besides removing the tar almost completely, causes the formation of oxides of nitrogen which can readily lead to the formation of gums and resins, and may cause trouble in the later cleaning and use of the gas.

The Detarring of C.W.G.

In carburetted water gas there is no ammonia or hydrocyanic acid present and so corrosion is not likely to develop except by the carbon dioxide present which usually presents no troubles. Electrostatic detarring could, therefore, with advantage be carried out to the maximum possible degree of one grain or less of tar fog per 100 cu.ft.

The tar fog in crude coal gas, as generated, is either in the form of fine fumes or smoke and, as has been shown earlier in this paper, such fine particles are much more difficult to precipitate either electrically or by other means. When, however, crude gas is conveyed along the mains through the condensers, these fine particles tend to agglomerate, and the larger they grow, the more readily do they fall out of the gas naturally by gravity, and the more readily are they precipitated by electrical or physical means.

With water gas, this is generally far more noticeable than with coal gas, since, in certain instances of carburetted water gas cleaning the detarrer vessel may be placed so close to the generator, that the length of travel of the gas through the mains and condenser is at an absolute minimum and, precipitation becomes very difficult. Thus, as great a distance of travel of the crude gas, preferably after cooling, before detarring is an advantage.

When there is a teed-off connection from the relief holder there may be a heavy cyclic fluctuation in the tar fog loading of the gas, though the gas throughput may be quite uniform. This is particularly so when only one generator is working. Investigation has shown that the H.T. current, in milliamps per electrode falls off when the tar fog concentration in the gas in the detarrer increases. The cause of the fall in the H.T. current is due to the dampening effect on the corona discharge by the heavier tar fog loading, and, in the modern H.T. Set with its two-halfwave rectification the voltage will tend to rise.

To deal with the differences in tar fog concentrations a higher capacity of H.T. set used to be necessary and a larger treater was needed to prevent arcing-over during the clean periods. To get over this difficulty, the Simon-Carves and Ferranti Staffs, working together, have developed an automatically controlled H.T. equipment by which the L.T. input current and the H.T. current in milliamps per electrode are both kept almost constant for fluctuating tar fog concentrations.

Producer Gas Detarring

Each installation for producer gas detarring requires individual and experienced design, and attention to operational details which vary with the conditions of the tar and dust. For bituminous coal producer gas, provided the off-take temperatures at the producer are 400°C. or less, hot gas detarring is usually successful since the tar is sufficiently fluid to flow, and will wash away any dust being precipitated from the plates.

For the detarring of coke producer gas each installation must be treated individually but mention may be made of two installations which behaved quite differently from one another. In one, in which slightly less carbonised coke was being used, it was found necessary to vapourise into the gas stream before detarring a sufficient quantity of anthracene oil, while in the other installation, it was soon found to be most disadvantageous to do so as this led to the formation of an emulsion with the dust and water mist precipitated, but instead to run it for a period of several weeks, shut down, and simply flush down the plates and wires.

Steaming of the vessel before flushing down, however, tended to form an asphalt-like mass on the receiving electrode plates which was very difficult indeed to remove.

Comparison between Electrical and Physical Means

By plotting curves for tar fog removal against H.T. current in milliamps per electrode, per mill. cu.ft. of gas passing it was possible to calculate the efficiency of precipitation. From available information obtained several years ago on a large gas undertaking, of the various tar fog concentrations at various points on the gas cleaning system, together with the relevant pressure drops, comparisons between physical and electrical methods seemed worthwhile.

The plant employed consisted of the orthodox units, Livesey washer, P. & A. tar extractor followed by an experimental ring packed filter column. When these results were plotted, they followed quite a smooth curve very similar to the electrostatic precipitation curve, and only indicated perhaps the practical or economic limitations of the physical method of precipitating the very fine tar fog particles.

This graph also offers a means of comparing the costs of the alternative methods. On a basis of a throughput of one mill. cu.ft. gas per day, for every milliamp H.T. current flow per mill. cu.ft. per day of gas. one K.wh. is required; for every 1 in. pressure drop, four B.H.P. is required. The very approximate cost of physical means, therefore, is something like seven to ten times that of the electrostatic method, and for conditions of high tar fog removal, this factor is likely to be increased even more.

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Gas and the Sixth Five Year Plan

TO begin with here is an extract from the Directive of the 20th Congress of the Chief Soviet relating to the People's Economy; the sixth Five Year Plan, 1956-60:

'To put into operation the approved plans for the construction of gas mains totalling about 9,000 kilometres in length, the largest of which are: Stavropol-Moscow (from the Georgian Border up to Moscow), Shevelinka-Kharkov-Kursk-Orel-Briansk (in the Ukraine), Dashava-Minsk-Leningrad (in Western Russia), Stavropol-Nevinnomisk-Mineral Waters-Grozny (in the Caucasus region), Kazan-Gorki (running east and west, south of Moscow), and to start preparing for the construction of two other gas mains Berezovo-Sverdlovsk (running north and south in the Urals), and Grozny-Tbilisi (in Georgia).'

By this Directive, the Congress foresees the output and production of gas by 1960 being increased to 40 milliards of cu. m. This colossal programme can only be realised with the aid of the Stavropol-Moscow gas main, along which gas will be pumped from the natural gas deposits situated a few miles from Stavropol.

This gas lies in tertiary deposits at a depth of between 750-850 metres (2,500-2,800 ft.) and the free yield in each separate borehole reaches several mill. cu. m. of gas per 24 hours. It consists mainly of methane and its chemical composition is as follows: CH_4, 98%, C_2H_6 + C_3H_8, 0.5%, C_4H_{10} and higher, 0.02%, N_2, 1.18%, CO_2, 0.3%. Its calorific value is 8,500 Kcal. per cu. m. at 0°C. and 760 mm., or 895.9 B.Th.U. per cu.ft.

Cyclone Separators

After emerging from the borehole the gas is purified in cyclone separators and measured. It then enters the industrial gas collecting network, where it is cleaned a second time in oil-dust collectors, and then passed through the drying plant. It is then measured again, odorised, and passed to the gas main. The gas from these deposits will also supply other mains, such as the Stavropol-Nevinnomisk-Grozny main.

The Stavropol-Moscow trunk main, the total length of which is over 1,300 kilometres (812 miles), is mainly intended to supply Moscow and the other towns situated along the route taken by this main. It will not only increase the domestic supply for Moscow, but will also be capable of providing fuel for central heating to the civilian population, to all industrial undertakings and power stations situated in the suburbs.

As more than half the capital's requirements of gas will be from this source, it will replace coal and heavy oil, the fuels at present in use. This will be a great boon to all as it will mean that the capital will become a smokeless zone.

It is planned in the future to link the Stavropol-Moscow main with twenty other towns, amongst them Rostov, Taganrog, Voroshilovgrad, Novocherkask, Voronezh, etc., for the purpose of supplying gas to industry in these towns. It is also proposed to divert a considerable quantity of this gas to chemical plants for use in the production of fertilisers.

This main will be the largest in Europe, and after the completion of the various pumping stations en route, its capacity will be three times as great as Dashava-Kiev-Briansk-Moscow main, and will far exceed the capacity of the first gas main already laid which runs between Saratov and Moscow. As the demand for gas becomes greater it is planned to lay a sister main of approximately the same dimensions.

The steel pipes used in this gas main, 700 mm., or 26¼ in. diameter, are suitable for high pressures and are being made from special steel. They have a longitudinal seam electrically welded under a layer of flux. The ends of the pipe are calibrated and the pipe is sunk to a depth of 0.9 metres or 3 ft. (measurement is taken from ground level to the top of the main).

Modern houses and living centres will be built to house the personnel who will be responsible for the maintenance of the many pumping stations, workshops, and laboratories erected en route. A modern transport system, consisting of sledges, helicopters, and other vehicles will be at the disposal of the maintenance personnel to enable them to carry out their duties in an efficient manner.

Obstacles

This main, on its run from south to north, crosses a variety of artificial and natural obstacles, *e.g.*, 65 rivers, 245 ravines, 130 main railway lines and many trunk roads, apart from the very many secondary and tertiary roads. Among the many rivers, the largest is the river Don, which has a depth of up to eight metres (27 ft.). The crossing of rivers, brooks and ravines is done either by fixed pontoons, or by aerial span.

A number of new technical features are being introduced among which is the construction of locally made gas compressors driven by electricity generated by a gas turbine developing 5,000 h.p. This power is greatly in excess of that at present needed to drive compressors on other gas mains. At the present moment preliminary work is being carried out upon the construction of gas powered compressors of 2,000 h.p. The use of these turbo-compressors will enable us to reduce

considerably the cost of building pumping stations and thereby our over-all expenses.

Instead of the telephone system in use, a radio network is being built, and radio masts will be erected at intervals of 50 kilometres (30 miles) which will greatly improve communications.

Instead of the pipe being joined together by linear bolts, which are normally used, flangeless cork triple taps, having a diameter of 400, 500, and 700 mm. (16 in., 20 in. and 24 in.) to work at a pressure of 64 kg. per sq. cm. (900 lb. per sq. in.) are being used. These taps are welded into the gas main and do not require any wells. They are more serviceable and in comparison with bolts have a better seal.

The erection of this gas main together with all its buildings and fittings is being undertaken entirely by our own technicians. The joining together of the pipe section by section, is being done by electric arc welding, and is in accordance with instructions laid down by Academician E. O. Paton of the Electric Welding Institute.

Conventional and rotor excavators will be used in digging the trenches, and all remaining processes for the laying of the gas main will also be mechanised.

In accordance with plans laid down in the Directive, the first phase of this work will be finished in 1957.

The Future of Fuel

Mr. Renton at the N.W. Fuel Luncheon Club

ADDRESSING the opening meeting of the North Western Fuel Luncheon Club, Mr. David Renton, Parliamentary Secretary to the Ministry of Fuel and Power, said that, taking for granted the need for more fuel and power every year for the foreseeable future, three questions arose: How much more should we need? How much should be got from each of the known primary and secondary sources? And how much and how little should the Government intervene in dealing with the problems which arose?

Estimates of long-term increases in demand had always varied considerably. In 1866 when the annual consumption was less than 100 mill. tons of coal, and assuming an annual increase of 3½% compound, Gladstone predicted that by 1961 we would be consuming 2,607 mill. tons per annum. But we knew we should be consuming about 280 mill. tons coal equivalent. This year we should consume 255 mill. tons (inland consumption only). Last year it was 250 mill. tons, and the rate of increase seemed likely to be about five mill. tons a year. It was fairly safe to assume an advance at that absolute rate, because better use of fuel should make it unnecessary to assume an increase at a compound rate. So there was a fair indication of short-term probabilities; an increase of five mill. tons a year for the next nine years, making 300 mill. tons by 1965. Although we knew we should need more after that, he saw no point in worrying precisely how much more at this distance ahead.

How much should be got from each of known primary and secondary sources? The short answer was easy: As much as possible from each. He was not going to attempt to allocate to the fuel-producing industries a fixed share of the growing demand for energy over the next few years. The fact was that energetic and expanding industries in a sellers' market should try to satisfy their market without much prompting from the Government, and that nobody could predict with precision how much more of each of the primary fuels would be used in five or ten years' time.

We did, however, know how much coal was likely to be available for home use and for exports. The N.C.B.'s realistic forecast in 'Investing in Coal' was that 228 mill. tons would be produced in 1960 and 240 mill. tons in 1965. Increase in coal production would therefore be proportionate to increase in demand. Other indigenous sources of fuel including hydro-electricity would continue to provide about 2 mill. tons a year coal equivalent. It was therefore clear that first oil and then oil and atomic power would be required in increasing quantities over the next nine years, which was the period with which he was dealing.

They had told the oil companies that they expected the consumption of black oils to treble itself between 1955 and 1960, during the years in which atomic power would be able to make only a small contribution.

A word about atomic power. We had a right to be proud of the progress which the A.E.A. and private industry had made in this field. As the Minister had said in the House last June, it was believed that it would be possible to accelerate the original nuclear power programme. But he thought it was clear that the effects of any such speeding-up would make themselves felt after, rather than before, 1960, if only for the reason that it took time to build a power station.

In the case of secondary fuels they could expect the rapid rise of electricity to continue and to double itself again in the next ten years. The increase in the use of gas had naturally been less spectacular, but the output of gas coke increased by 13.4% between 1950 and 1955, and the output of hard coke by 17.5%. The Clean Air policy would require substantial increases of gas and gas coke, while the steel industry would probably require hard coke production to increase even more steeply over the next five or ten years.

We were obviously going to need all primary and secondary fuels we could lay our hands on for the next ten years—and, indeed, thereafter.

How much and how little should the Government intervene in dealing with the problems which arose? The Government's objectives were to intensify production, discourage waste, stimulate new developments. How should those objectives be achieved. The Minister had no statutory control over the oil industry, though he kept in touch with its leaders and consulted with them on matters affecting national interest. He had powers in relation to coal, gas and electricity industries, but he rode them with a pretty loose rein and with rather blunt spurs. So with them, too, his principal task was to keep in close touch with them and help them, but to give them only very broad guidance.

It was often said that the Minister should intervene to a greater extent by formulating a planned fuel and power policy to ensure better use of our scarce supplies. This would introduce an element of compulsion over producers and consumers. It might have certain superficial advantages. But the Government rejected it for these reasons:—

(1) Compulsion was if at all possible to be avoided.

(2) Plans imposed from above were particularly liable to error.

(3) The competitive element in the nationalised industries would be weakened.

(4) And this was perhaps most important. They wanted the best men they could find to lead the nationalised industries. They were not going to get them, if they did not let them get on with their jobs and be fully responsible for them.

Competitive Limits

They encouraged the four industries to compete so far as possible. There were, however, obvious limits to that competition, e.g., electricity nearly had a monopoly of lighting, and gas penetrated to few rural areas. They also encouraged the four industries to co-operate when appropriate, although they had never forced it on them. Examples of such co-operation were:—

(1) Co-operation between gas and oil industries over the use of refinery gases and surplus products.

(2) Co-operation between coal and electricity on siting of power stations.

(3) Underground gasification presented a nice problem, bearing in mind the monopolistic rights of the Coal Board to mine coal, of the gas industry to sell gas, and of the C.E.A. to generate and sell electricity. But the Gas Council gracefully kept out of the picture.

In spite of the general policy of letting the industries run their own shows, there were some positive steps which the Government had taken and was taking to solve our fuel and power problems.

(i) *Stimulating new developments.*

The Government, through the Scientific Division of the Ministry, played an important part in research, especially when the money risk was too great even for a nationalised industry, and when too much capital was needed for private research.

(a) Underground gasification was the most notable example. They had spent over £½mill. on that before handing it on to the N.C.B. for the pilot stage.

(b) Successful experiments had taken place on investigating how peat could be used as an industrial fuel.

(c) Production of electricity in fuel cells, and the use of coal in connection with gas turbines, were other matters which had engaged their attention.

(d) They were expected to acquaint themselves with all scientific developments which might help the country's growing fuel problems. Some of them seemed hopeful until it came to practical application; tidal power and a revival of the windmill, were examples. And he himself had had to withstand fire at Question Time for refusing to commit the Government to obtaining heat from the sun!

(e) The Gas Council had made itself responsible for the development, and if possible, the import of natural gas.

(iii) *Discouraging waste.*

This was something in which the Government should and did intervene directly. This year especially, the Government had stimulated the proper development of our fuel economy by fiscal help. He referred to the restoration of the investment allowances for fuel saving equipment and the continuance of the Government's Fuel Efficiency Loan Scheme, which was being used increasingly. They realised that they had a special duty to see that their precious supplies of coal and oil were not wasted. That was why they had pioneered the National Industrial Fuel Efficiency Service and were giving it all possible encouragement.

Another, and in the Long run more potent, weapon, was the Clean Air Act. Lamentably enough, raw bituminous coal was still burnt on a huge scale in this country, often in the most wasteful manner, when secondary fuels would be better. In the North of England people still used coal considerably for cooking. Millions of fireplaces still caused 80% of the thermal value of coal to be lost, and sent clouds of carboniferous smoke to be inhaled by our lungs with disastrous results. But the Clean Air Act would over the next 15 years largely stop all that, they hoped. The aim was to replace 19 mill. tons of raw bituminous coal burnt by householders in black areas; and gas, electricity and oil would each have a part to play, as well as coke and other solid fuels.

On the industrial side, it would be an offence for industry to make dark smoke under the Clean Air Act. Clean Air meant greater fuel efficiency and *vice versa.* He strongly advised industrialists to take advantage of the Chancellor's generosity in restoring investment allowances for fuel-saving equipment, and to kill two birds with one stone—save fuel and be safe from the arm of the law.

(iii) *Intensifying production.*

The Government's principal responsibility and opportunity was in providing capital for nationalised industries. They reckoned they had done well for these industries; and they looked to them to see that they spent the money wisely.

(a) They had sanctioned N.C.B.'s £1,000 mill. ten-year development programme, of which one third would be found from increased borrowing, and the rest from the Board's own resources. Nasser's grab has underlined the wisdom of that decision.

(b) As to nuclear energy the A.E.A. has had untold millions of public capital for research and development; and the C.E.A. had been given permission to spend £300 mill. in ten years in building atomic power stations.

(c) For electricity cuts due to credit squeeze were not drastic and did not effect the nuclear power programme.

(d) The gas industry—a most important industry with a great future—had received about as much capital in recent years as it could use.

It is their aim to see that these industries had the money they needed to develop not just one or two years ahead but in the long term. For this fuel and power problem was a long-term one as well as an immediate one.

The Way to Clean Air*

By D. P. Welman, M.I.Mech.E., A.M.I.E.E.

THROUGH the passing of the Clean Air Act we shall have the means to prevent the emission of smoke, which means in the case of householders, a virtual prohibition on the use of smoky coal. But that is only part of the story. The next step is to decide which of the alternative fuels should take the place of coal.

The advance of electricity and oil is likely to be rapid. But so, too, is the rate of advance in the total demand for fuel. But estimates show that in 15 years' time Britain's homes will need an additional 13 mill. tons of coal (or the equivalent of coal in other fuels) annually. If electricity and oil advance at the maximum rate and double their supply in these 15 years, then they could just manage to provide this extra 13 mill. tons and we would probably find at the end of that time that just as much smoke was being poured into the atmosphere from domestic grates as there is at present.

This problem of the 19 mill. tons of smoky coal burnt in household grates in the 'black' areas needs the help of all the smokeless fuels, and, since we are trying to displace a solid fuel used for long-period heating, we should preferably find a smokeless solid fuel.

The total annual production of the recognised carbonising coals in this country is about 130 mill. tons, or more than half of the total coal output. And of this 130 mill. tons only about 55 mill. tons are actually carbonised. The remaining 75 mill. tons are burned direct on open grates or used for steam raising and other purposes, equally well satisfied by coals unsuitable for carbonisation.

* From a paper to the National Smoke Abatement Society, Southport, October 3-5

The Appliance

Coke is an efficient fuel because the smoke-producing substances, which cannot be efficiently burned in an open fire, have been removed from it. But if you burn coke in an old-fashioned grate there is no effective control of the air-flow to the fire provided. What is needed is a modern grate in which the air current under the fire is directed at the point where it can efficiently sustain the process of burning and some controlled restriction of the chimney aperture to regulate the overall volume of the air flow.

There is now a tremendous drive in progress throughout the industry to obtain the high and consistent standard of quality which the Beaver Committee established as our target. This has been necessary because the gas industry is after all a *gas* industry, and our production and selling policy was mainly geared to the gaseous product. But now we are on the move, and we are determined to satisfy the requirements of this new market that has been opened up for us.

So successful has been our attack on this problem that the Board are now producing two fuels which they have called 'Thermalite' and 'Thermax.'

The board feel that 'Thermalite' can and will offer one of the greatest advances yet made in the campaign for clean air.

'Thermax' is a somewhat different fuel, having high density in addition to ready ignition and long-burning characteristics and is likely to prove ideal for the closed or openable stove.

'Thermalite' may be available to the market in quantity during the coming winter and 'Thermax' at some later date.

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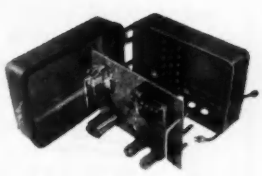

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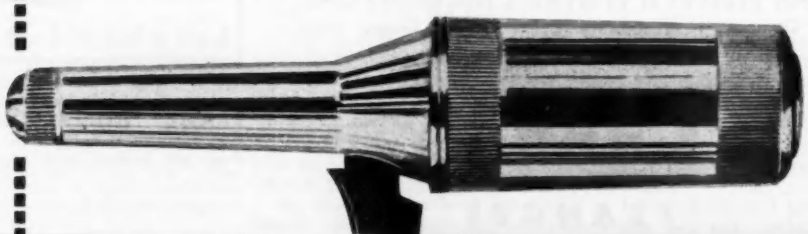

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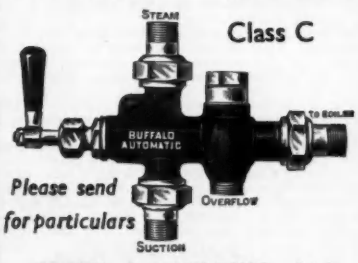

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SCOTTISH GAS BOARD

NORTHERN DIVISION
TECHNICAL ASSISTANTS

APPLICATIONS are invited from suitably qualified persons for positions as TECHNICAL ASSISTANTS within the above Division. Applicants should be experienced in gas works testing and in the operation and maintenance of gas works plant.

The salary will be within Grades A.P.T. 6/7 Provincial "A" £610-£750 per annum with placing according to qualifications and experience.

The posts are superannuable, and the successful candidates may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should be submitted to the undersigned within ten days of the appearance of this advertisement.

H. S. MILNE,
Divisional Controller.

50, Cotton Street,
Aberdeen.

October 6, 1956.

SCOTTISH GAS BOARD

NEWTON ON AYR DISTRICT
SENIOR TECHNICAL ASSISTANT

APPLICATIONS are invited for the post of SENIOR TECHNICAL ASSISTANT in the Newton on Ayr District Undertaking.

Applicants should possess the Higher Grade Certificate of the Institution of Gas Engineers, or an equivalent qualification, and should have experience in the operation, maintenance and layout of Gas Works Plant and Distribution Systems. A knowledge of the operation of Continuous Vertical Retorts and Carburetted Water Gas Plant is desirable.

The salary applicable to the post will be within APT Grade 7 (£670 to £750) of the National Salary Scales for Gas Staffs.

The position is pensionable, and the successful applicant will require to pass a medical examination.

A house is available at a reasonable rental.

Applications, stating age, and giving particulars of education, training, experience, and qualifications together with the names of two referees, should be addressed to the undersigned to arrive not later than October 24, 1956.

C. E. N. FRESHNEY.
Engineer and Manager.

Newton on Ayr Gas Works,
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2. MECHANICAL ENGINEER

Salary Range £800-£1,175. Applicants must be capable of taking charge of maintenance on a large modern coke oven plant including electrical power station. Essential qualifications are: 1. Sound mechanical training in workshops and drawing office including some training in structural and civil engineering, 2. A working knowledge of heat and corrosion resisting material, 3. A sound knowledge of the fundamental principles of applied physics and chemistry, 4. Experience in a responsible position in the maintenance of chemical plant and boiler plant. A recognised qualification in Engineering is desirable.

Applications stating age, qualifications and experience to Administrative Officer, N.C.B., N.E. Division, Carbonisation Department, Standfield House, Fulwood Road, Sheffield 10, by October 20, 1956. Envelopes marked "Staff Vacancy."

ASSISTANT PHYSICIST or Engineer required for development work on controls for the gas industry. Candidates should have a degree or H.N.C. but previous experience is not necessary. Apply with full particulars to:—Technical Manager, Engineering Division, Evered & Co. Ltd., Surrey Works, Smethwick 40.

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A VACANCY for the above exists. Candidates should have a good basic scientific training and be able to carry out all routine testing on a modern Gasworks.

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EAST MIDLANDS GAS BOARD

LINCOLNSHIRE DIVISION
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APPLICATIONS are invited from suitably qualified persons for the post of TECHNICAL ASSISTANT at Gainsborough at a commencing salary within grades APT. 5/6/7 (£575/£750 p.a.) according to age, qualifications and experience.

Applicants should preferably be in possession of, or studying for, the Institution of Gas Engineers High Grade Certificate in Gas Manufacture, or equivalent qualifications. They should also have had practical experience on a modern gasworks, with special reference to continuous vertical retort practice and auxiliary carburetted water gas plant.

The position is pensionable, and the successful applicant will be required to pass a medical examination.

Applications, giving details of age, education, training, qualifications and experience, together with the names of two referees, should be addressed to reach the undersigned not later than October 27, 1956.

BERNARD CLARKE,
Divisional General Manager.

Belle Vue House,
Carline Road,
Lincoln.

October 5, 1956.

WEST MIDLANDS GAS BOARD

WOLVERHAMPTON AND DISTRICT DIVISION
APPOINTMENT OF FOUR SALES REPRESENTATIVES

THE successful candidates will be required to attend to consumers' enquires, prepare estimates and develop sales. A knowledge of domestic appliances, gas fitting and consumer service is necessary and selling experience will be an advantage. The successful candidates will be sent on a comprehensive training course.

The salary for the post will be within A.P.T. Grade 6 (£610/£690 per annum) of the National Salary Scales.

The posts are pensionable, and the successful candidates may be required to pass medical examinations.

Applications stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. S. Jones, Divisional General Manager, West Midlands Gas Board, Kensington House, Bath Street, Dudley, to reach him not later than Monday, October 22, 1956.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WOLVERHAMPTON AND DISTRICT DIVISION
VACANCIES FOR
DRAUGHTSMEN, DIVISIONAL ENGINEER'S OFFICE

CANDIDATES should have had experience in engineering draughtsmanship, structural and building work, and knowledge of gasworks plant will be an advantage. They should be capable of carrying out surveys and the preparation of drawings, specifications and estimates. The qualifications expected will be of Higher National Certificate standard.

The salaries will be within A.P.T. Grades 8 (£710-£790 per annum) and 9 (£755-£855 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidates may be required to pass medical examinations.

Applications stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. S. Jones, Divisional General Manager, West Midlands Gas Board, Bath Street, Dudley, to reach him not later than October 18, 1956.

J. C. INGRAM,
Secretary to the Board.

EXPERIENCED MECHANICAL ENGINEERS required as inspectors for field supervision work on the construction of a Natural Gas Pipeline in West Pakistan. Salary Rs (Pak.) 2,000 per month with free accommodation, messing and medical services. Duration of employment approximately six months with possibility of extension. Write giving full details of career and stating age to Box GJ.755, c/o. 191, Gresham House, E.C.2.

DEPUTY PERSONNEL MANAGER required by the South Western Gas Board. Applicants should be between 25/40 years of age and have had practical experience in all aspects of personnel work, especially in trade union negotiation, joint consultation, communications and the development of internal training and education. University training and/or a knowledge of the gas industry's industrial relations organisation would be an advantage, but are not essential. The appointment will carry a good salary to the right man.

Applications should be sent to the Secretary and Accountant, South Western Gas Board, 9a, Quiet Street, Bath, not later than October 31, 1956.

PLANT MANAGER required to take control of chemical processes. The candidate should have a degree in chemistry, engineering or chemical engineering and wide experience in the chemical, petroleum chemical or tar industries. The position offers possibilities of advancement and a high salary will be paid to the man who proves a success.

Applications should be sent to the General Manager, Laporte Chemicals, Ltd., Baronet Works, Warrington.

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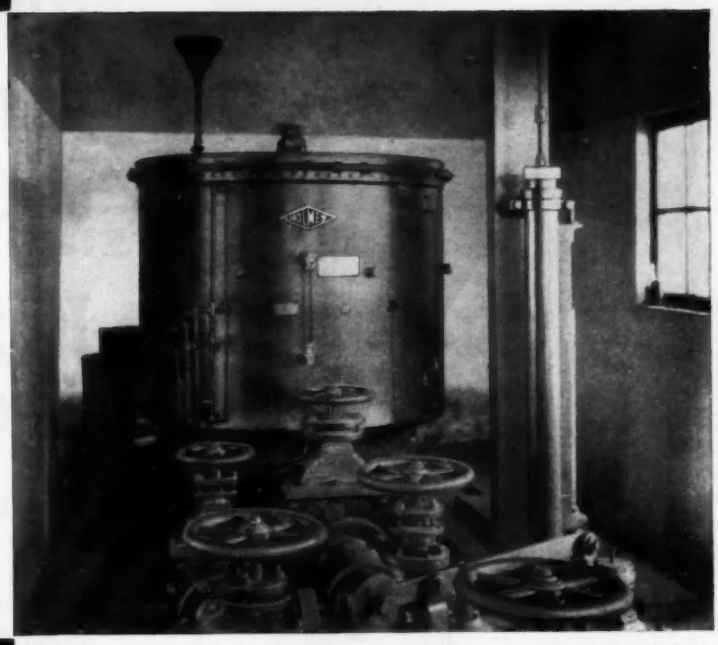

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B. M. METERS

Our illustration shows the first B.M. Meter put to work in this country, which was supplied to the Workington Corporation Gas Department in 1931. This authority was providing a bulk supply of gas to the Harrington U.D.C. Gas Works, which was thereafter closed down for manufacture.

The system represents an early development of gasholder supply control from a high pressure line. The incoming gas passes through a 4" diameter Bryan Donkin Reynolds District Governor followed by a holder cut-off valve operated by a weight carried on a wire rope and raised or lowered by the movement of the holder.

The latter was of a spiral guided type, and the mechanical connection between the gasholder and cut-off valve was entirely designed and constructed by Mr. J. G. Pope of the Workington Corporation Gas Department. The whole system and some special precautions, are of a high degree of ingenuity, and the operation has been entirely trouble-free throughout the whole period.

Full details of the B.M. Meter are available in Publication No. 51/5

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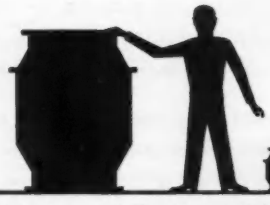

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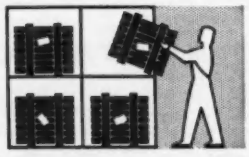

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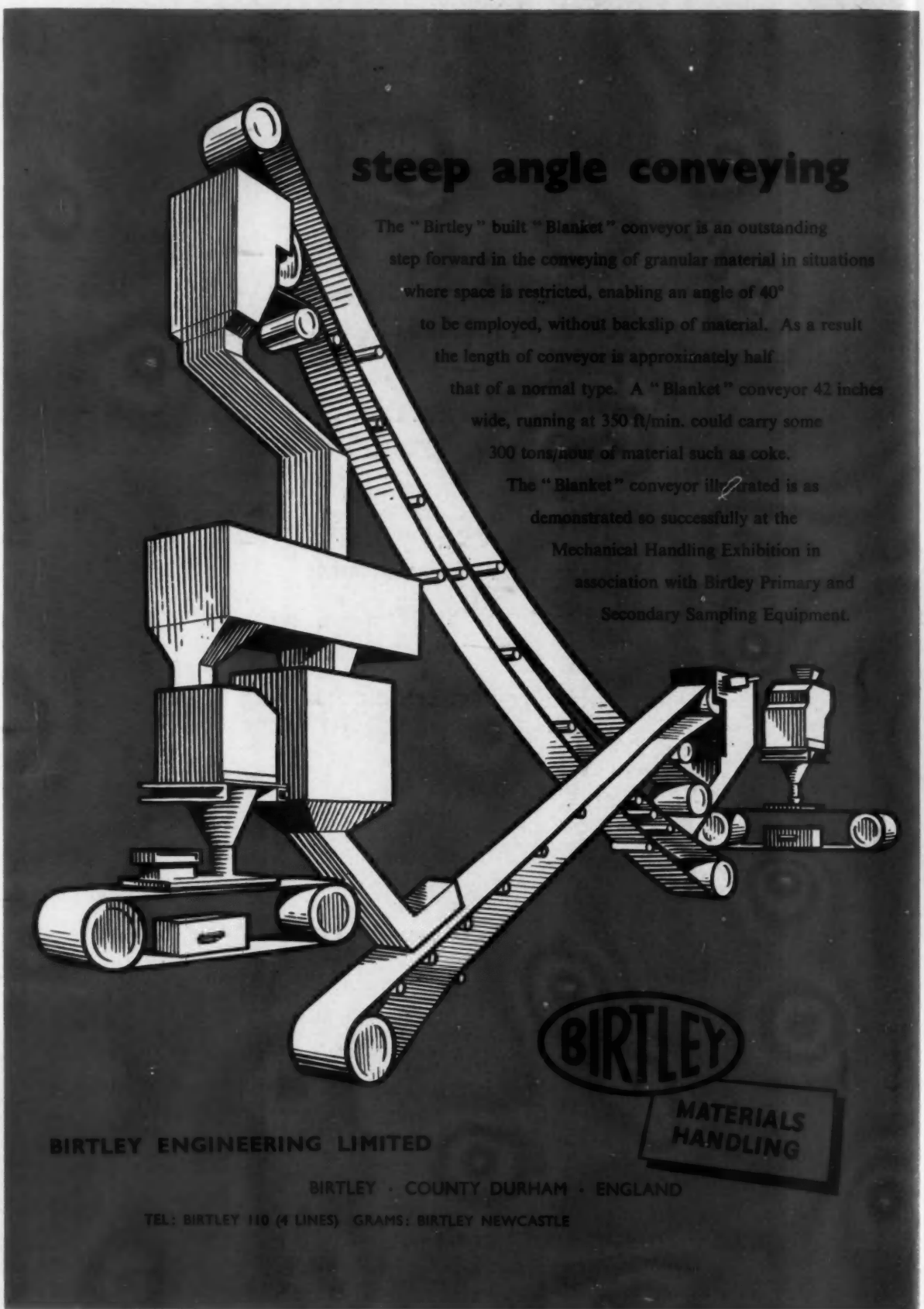

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